

# F2A Buffalo

*in action*



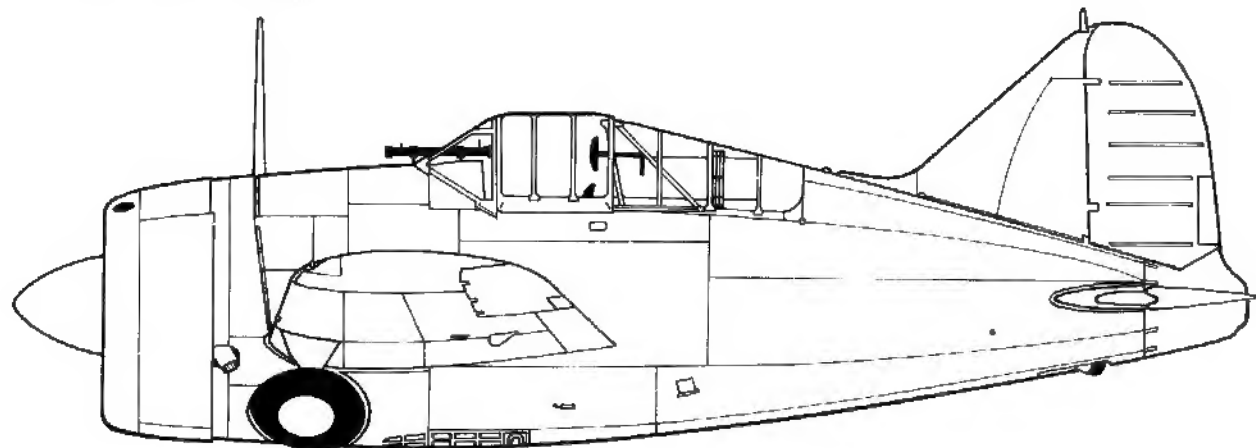
squadron/signal publications, inc.

Aircraft Number 81

# **F2A Buffalo**

**By Jim Maas**  
**Color by Don Greer**  
**Illustrated by Perry Manley**

***in action***



**squadron/signal publications, inc.**

**Aircraft Number 81**



CAPT William C. Humberd of VMF-221 shooting down a Zero in a head on attack during the Battle of Midway. CAPT Humberd engaged the A6M2 from the AKAGI air group low over the water after diving his F2A-3 Buffalo away from pursuing Japanese fighters. Humberd, a Marine, was awarded the Navy Cross for this action.

## Designations

The Brewster F2A fighter universally became known as the Buffalo but factory records indicate that Buffalo was used solely for the British variant until 1 October 1941 when the Navy adopted the British name. F2A production would become a confusing tangle of model designations used by Brewster to distinguish the various Buffalo variants.

Navy aircraft were referred to only by their service designators: F2A-1, F2A-2, and F2A-3 until 1 October 1941 when the Navy officially adopted the name Buffalo. Export variants were identified by a Brewster assigned model number using a three digit company number with variants identified by a letter suffix. Under this system, the company export equivalent of the Navy F2A-2 was the Model 339, subdivided into Model 339Bs for Belgium, 339Cs and Ds for the Netherlands East Indies, and 339Es for Great Britain. During 1941, the company began a system of 'dash numbers' to replace the letter suffix — the 339C became the 339-18, the 339E became the -13 and -21. The reason for this change is not clear, but the last Buffalo built was recorded as having a data plate in the cockpit identifying it as a Model 339-23 (the last Buffalo variant is often mis-reported as being a Model 439).

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## Dedication

For Sandi, and the NENY gang.

## Photo Credits and Acknowledgements

Over the years the files of the Brewster Aeronautical Corporation have been so widely scattered and the Buffalo saw such widespread service that recreating its history required the help of a number of historians, former Brewster employees, and Buffalo pilots. These individuals generously helped with photographs, documents, background information, and deserve my heartfelt thanks.

I.L.B. Aitkens  
Gerry Beauchamp  
Dayton Brown Jr.  
J. Cranston  
Nick O'Appuzo  
Phil Edwards  
Ken Francella  
George Inger  
J.S. Linn  
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Carl Vincent  
Nicholas J Waters III  
Steve Zaloga

This Brewster Model 339D was built for the Netherlands East Indies Army Air Corps but would end its career in Australia as part of the US Army Air Force.







# Introduction

Few aircraft in the annals of aviation history have had as much controversy attached to them as the Brewster Buffalo. The history of the Buffalo is full of contradictions. Designed as a carrier based fighter the Buffalo saw combat only from land bases. Built for the Allies, its most successful use was by Finland, a co-belligerent of Germany. A significant part of the American 'Arsenal of Democracy', the Buffalo would be later used as an example (and excuse) for the Allies' unpreparedness during the early dark days of the Pacific War. Yet on the Eastern Front, Finland achieved a victory ratio with the Buffalo higher than with more modern fighters.

The Buffalo was designed and built by the Brewster Aeronautical Corporation of Long Island, New York. During 1932 Brewster was primarily a subcontractor, building components for other aircraft companies, but Brewster wanted to expand into the design and production of complete aircraft. Utilizing the talents of Dayton T. Brown, its chief designer, Brewster decided to concentrate their efforts on the Navy carrier-based aircraft market. Brown's first design, an advanced all-metal monoplane dive bomber, won a U.S. Navy development contract during 1934 and the prototype, designated the XSBA-1, flew during April of 1936. Despite a lengthy development period, the Navy was impressed with the design and purchased the production rights, building the aircraft at the Naval Aircraft Factory under the designation SBN-1.

During 1935, Naval Aviation was centered around four aircraft carriers. Navy planning dictated that in wartime the carrier's primary role would be reconnaissance and scouting for the main Battle Fleet. Carrier based fighters were to escort strike groups of bombers and torpedo planes to soften up enemy fleets for the American battleships. Secondary fighter roles included light bombing and fleet air defense. During the 1930s, stringent budgets and the small number of carriers meant that contracts for new aircraft seldom ordered more than thirty or forty machines, enough for several eighteen aircraft squadrons. With each new contract, the Navy sought aircraft with significant advances in performance and capabilities. An aircraft's suitability for mass production was not a high priority.

Against this background, the Navy opened bids for a carrier fighter to replace the Grumman F3F biplane. The design competition produced proposals from Grumman, Seversky and Brewster. Grumman's design was for an advanced biplane fighter, while both Seversky and Brewster submitted designs based on a monoplane configuration. The success of the XSBA-1 design had given Brown credibility as a designer of modern military aircraft and his monoplane fighter design would exploit many of the technical features proven on the XSBA-1 monoplane.\*

Brown's design, given the Navy designation XF2A-1 (BuNo 0451), was a state-of-the-art mid-wing monoplane with an enclosed cockpit and retractable landing gear. The original design featured a simple open ring cowl around the engine — either a Wright XR1670-02 or Pratt and Whitney XR1535-92, driving a variable pitch Hamilton Standard propeller. The wing was to be fabric covered aft of the main spar with metal leading edges. During the design's early development, these features were replaced by a full engine cowl and an overall flush-riveted metal wing with fabric-covered control surfaces. The fuselage had an oval cross section and stressed aluminum skin. The cockpit canopy slid back to open and featured a telescopic gun sight. The rear portion of the



**Dayton Brown's first design for Brewster was this Navy scout bomber prototype, the XSBA-1. When first flown in 1936 the XSBA-1 was an advanced aircraft and many of the features proven on it were later used in the single seat XF2A-1 fighter.**

cockpit housed a life raft, radio direction finding (RDF) antenna, and turnover pylon. To provide the pilot with a degree of downward view a large multi-paneled window was installed in the belly.

The wing was a one piece box-beam structure, as opposed to separate port and starboard wing panels, and incorporated split hydraulically operated flaps to lower the landing speed for operation from aircraft carriers. The tail surfaces were elliptical and the horizontal tail was mounted on the rear fuselage slightly above the level of the wing. Armament was specified as one .30 caliber and one .50 caliber Browning machine gun mounted in the top of the engine cowl synchronized to fire through the propeller arc, and provisions were made for fitting a .50 caliber machine gun in each wing just outboard the main landing gear.

**The XF2A-1 began company test flights during the Autumn of 1937. The aircraft was one of the most advanced naval fighters of its day with hydraulically retracted landing gear and stressed metal construction. The XF2A-1's elliptical vertical tail would later prove to have insufficient area and the canopy would be redesigned to improve head room and forward vision.**



\* Many historical references cite R.D. MacCart as the Buffalo's co-designer. This is incorrect since MacCart did not join the Brewster Aeronautical Corporation until 1940.



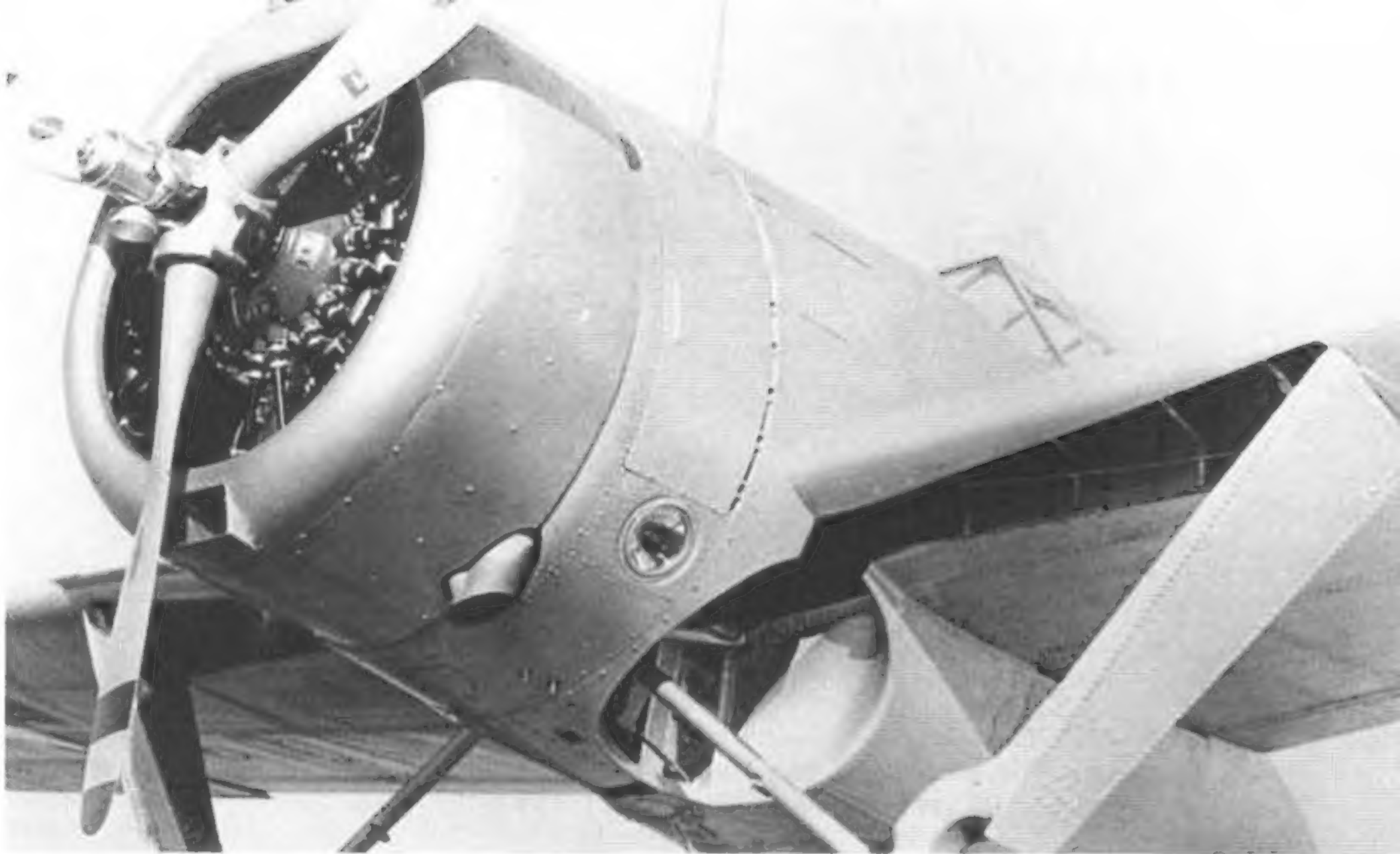
The most distinctive feature of the new fighter was the retractable landing gear. During the 1930's, an amazing variety of methods for retracting landing gear were tried and Dayton Brown's design sought to avoid complex folding by taking advantage of the different angles between the wing and the fuselage wheel well. The gear leg, when retracted, fitted flush into a bay on the underside of the wing, while the shock absorber, axle, and tire, mounted at an angle to the landing gear leg fitted into a wheel well in the fuselage underside. The landing gear was raised and lowered by a hydraulically activated folding strut attached to the lower end of the gear leg, running to a housing inside the wheel well. A semi-retractable tail wheel was fitted and when extended, a deflector plate covered the front of the wheel to insure that the arresting wires engaged the tail hook, not the tail wheel. The tail hook was installed at the extreme rear of the fuselage and was fully retractable.

Brewster began construction of the prototype XF2A-1 during March of 1936, three months before the Navy signed an official contract for the prototype. During construction, it became obvious that both of the proposed engines were underpowered and Brewster sought and obtained Navy permission to change the engine to the 950 HP Wright R1820-22 Cyclone. The XF2A-1 flown by Brewster test pilot Mel Gough made its first flight on 2 December 1937. The hand crafted prototype was delivered to the Navy for acceptance tests on 13 January 1938. Results of initial Navy flight tests were disappointing and revealed that improvements in streamlining, a redesign of the engine cowling, and re-contouring the carburetor and oil cooler air intakes would be necessary before the prototype's anticipated top speed of 295 mph could be achieved. Modifications were made by Brewster based on data obtained during full scale wind tunnel tests at the National Advisory Committee for Aeronautics (NACA) at Langley, Virginia. Testing continued with the modified prototype and performance was dramatically improved with a top speed of 304 mph at 16,000 feet, an initial rate of climb of 2,750 feet per minute, and a range of 1,000 miles. The Navy officially accepted the XF2A-1 during June of 1938 and ordered series production of fifty-four Brewster fighters under the designation F2A-1 during that same month.

During early 1939, the prototype was returned to Brewster for installation of the more powerful 1,200 HP Wright 1820-40 Cyclone engine. While installing the new engine Brewster completely redesigned the cowling to improve its aerodynamics and to avoid center-of-gravity problems, the fuselage was shortened by five inches forward of the wing. Redesignated the XF2A-2, but carrying the same Bureau Number (BuNo 0451) the prototype again began flight tests during July of 1939 and demonstrated a marked increase in performance. Top speed was now 340 mph and maximum range had increased to 1600 miles. Further modifications to the prototype during September included the installation of a fin with increased area for greater directional stability.

The prototype XF2A-1 proved that the Brewster Aeronautical Corporation could develop successful designs, but its production facilities were ill-suited to the mass production of modern aircraft. The multi-level Brewster factories were located in the middle of Queens, New York across the East River from Manhattan. Sub-assemblies were fabricated on different floors of the factory buildings and moved back and forth on freight elevators. Located in the midst of an urban area there was no easy access to an airfield and completed aircraft had to be disassembled, crated, and trucked to airports miles away before they could be test-flown. Later facilities would be purchased at Newark Airport in New Jersey for final assembly and test flights.

These manufacturing problems severely handicapped Brewster, making it difficult to translate promising designs into production aircraft. As demands from both the Navy and foreign customers increased, these problems would lead to serious difficulties for Brewster. Additionally, Brewster salesmen shamelessly promised foreign customers far



**The XF2A-1 cowling had square carburetor and oil cooler intakes. The landing light on the fuselage side pivoted forward on a hinge when in use and shined through the propeller arc creating a strobe effect. The light was later relocated under the port wing to eliminate this problem.**

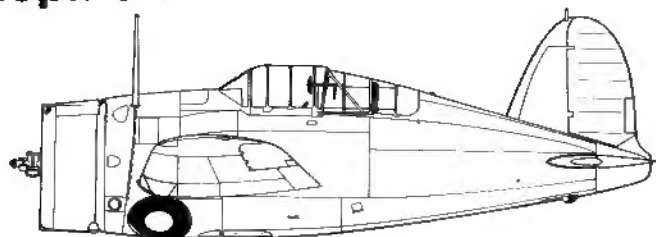
higher delivery rates than the modest plant could produce. Eventual Navy disenchantment with Brewster management that would result in charges of profiteering were still in the future as the prototype XF2A began its tests but would eventually cost Brewster contracts and lead to the decline of the company as a major aircraft manufacturer.

**During April of 1938 the XF2A-1 underwent full scale wind tunnel tests which revealed changes were needed to improve the streamlining of the cowling. The carburetor and oil cooler intakes were re-contoured and a propeller spinner was added. Performance of the prototype was significantly improved and the Navy ordered fifty-four aircraft under the designation F2A-1.**

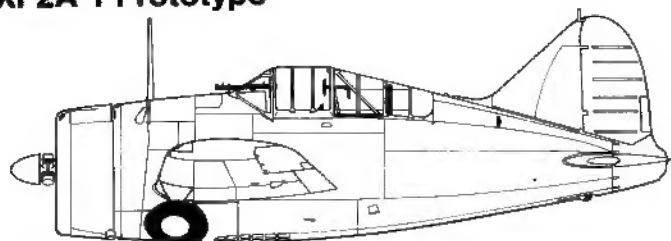




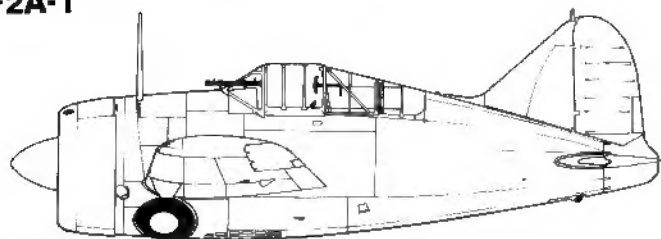
# Development



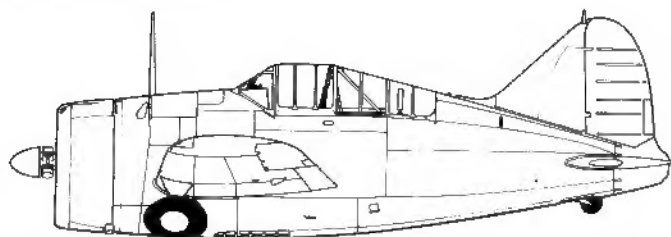
**XF2A-1 Prototype**



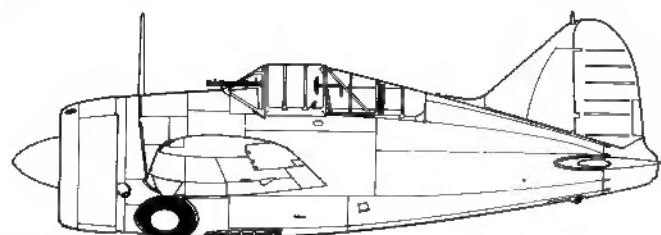
**F2A-1**



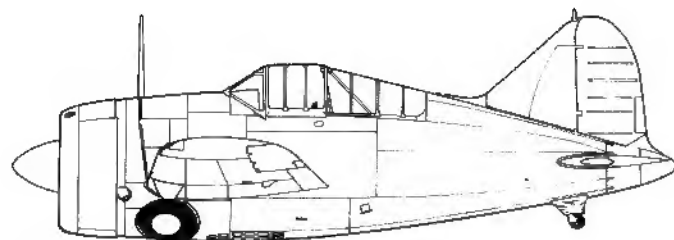
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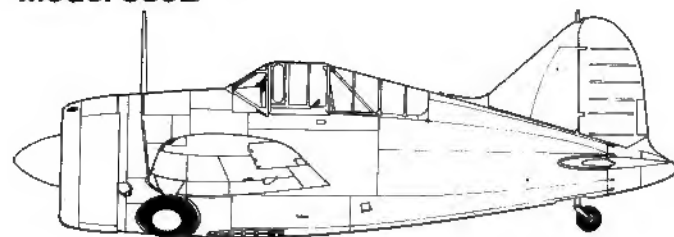
**Model 239**



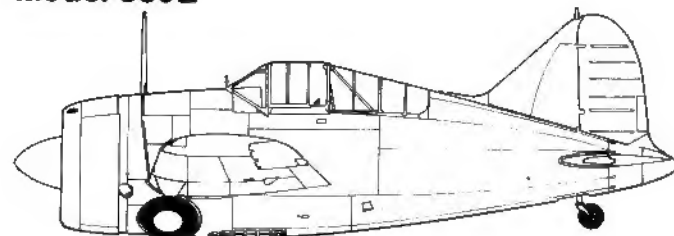
**F2A-2**



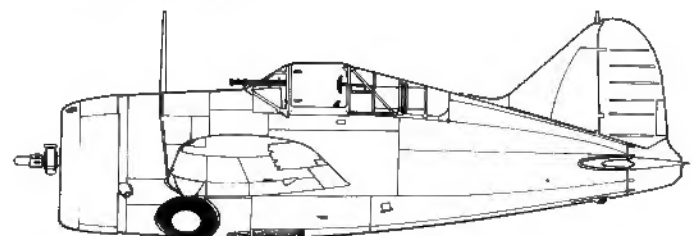
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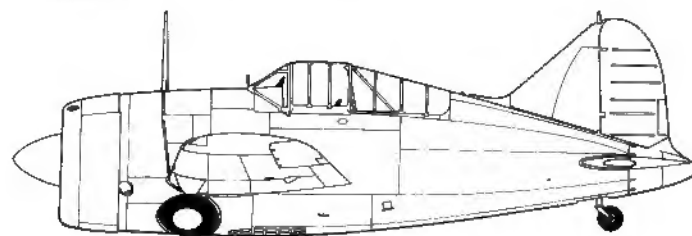
**Model 339E**



**Model 339C/D**



**F2A-3**



**Model 339-23**



# F2A-1

The Navy completed acceptance tests of the modified XF2A-1 prototype during June of 1938, and satisfied that the prototype met all performance goals, ordered production of fifty-four aircraft under the designation F2A-1 (BuNos 1386-1439).

Although retaining an upgraded Wright R-1820-34 Cyclone engine and Hamilton Standard propeller of the prototype, production F2A-1s incorporated a number of changes and improvements. A re-designed windscreen and canopy was installed improving forward vision and head room, and a telescopic gun sight was fitted. The radio mast was re-positioned from the port side of the fuselage to the starboard side, the landing light was moved from the cowlings to the lower port wing, and the wingtips were re-contoured. The ventral window was enlarged and the unframed glass panels were replaced with framed panels. The first two production F2A-1s were completed with the graceful elliptically shaped fin but the third production aircraft received the redesigned fin, with a straight leading edge that faired into the fuselage just behind the canopy, which had been tested on the XF2A-2.

Several months elapsed while Brewster developed the tooling and jigs needed for 'mass production' of the fifty-four F2A-1s. The Navy expected first deliveries during May of 1939 but in the event Brewster was able to finish only one example, BuNo 1387 (with the original fin) in time for the June 1939 World's Fair in New York. Delays continued and by November Brewster had delivered only five F2A-1s. Navy acceptance tests revealed excessive carbon monoxide levels in the cockpit and the aircraft were returned to Brewster for modification. A gas venting system with small rectangular outlets on the upper rear fuselage sides just below the fin was designed and retrofitted to all F2A-1s on the production line.

By mid-December of 1939 eleven F2A-1s had been officially accepted by the Navy and nine were assigned to Fighting Squadron Three (VF-3) aboard USS SARATOGA. Fighting Three became the Navy's first fighter squadron equipped with an operational monoplane fighter. Navy plans to re-equip additional squadrons were interrupted when

**The second production F2A-1 with the original fin was displayed at the July 1939 New York World's Fair along with other American aircraft. Navy markings were painted on for publicity purposes and depict a squadron leader's aircraft of Fighting Squadron 3 (VF-3).**

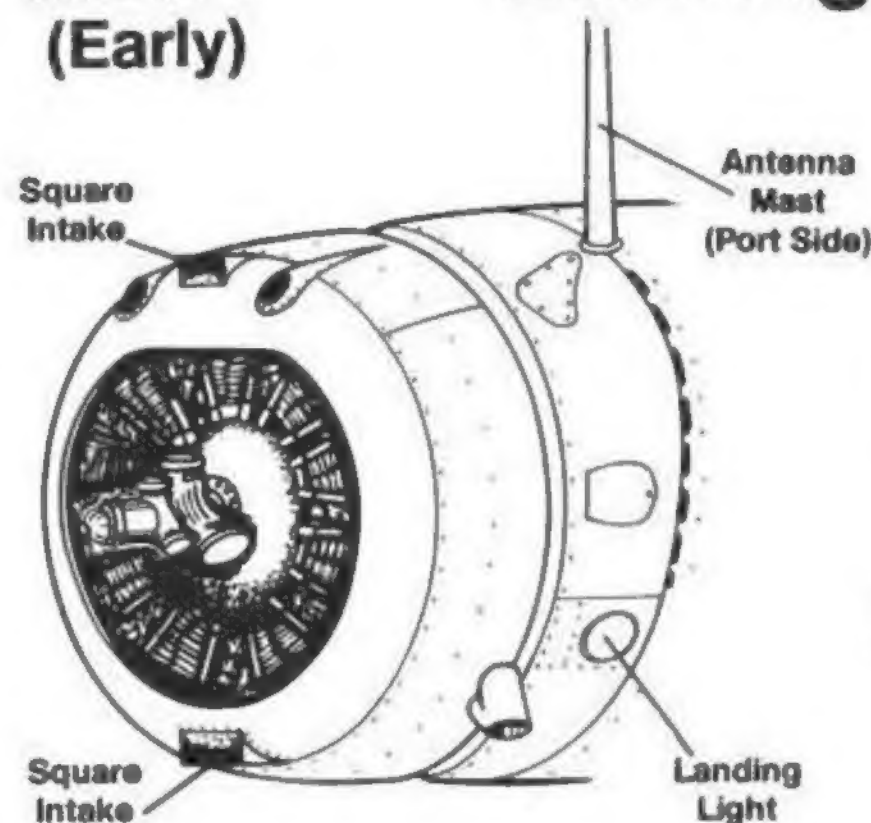


**The third production F2A-1 incorporated the revised fin and gas vents on the fuselage just below the fin. Delivered to VF-3, this F2A-1 is painted in overall Silver lacquer, with Chrome Yellow upper wing surfaces, White tail and upper cowlings surfaces.**

the remainder of F2A-1 production was diverted to Finland, which had been invaded by Russia during the previous November. As a result of this decision, only eleven F2A-1s (BuNos 1386-1396) were to see Navy service. VF-3 operated as a mixed squadron equipped with F2A-1s and Grumman F3F biplanes during most of 1940.

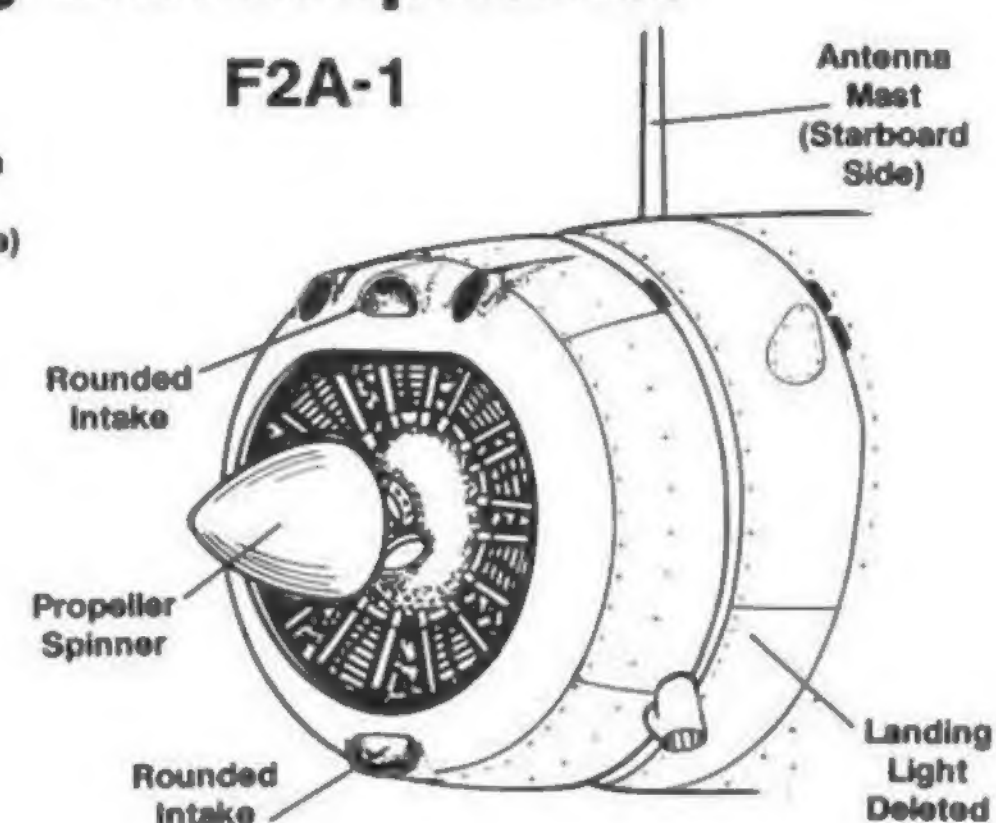
During the Spring of 1940 the Navy decided to install the optional .50 caliber machine guns in the wings of the F2A-1. The increased weight of the machine guns caused greater stress on the landing gear during carrier landing and VF-3 began reporting landing gear failures — a problem that would plague the Buffalo throughout its service career. In October of 1940, after SARATOGA's air group participated in the Barclay camouflage experiments, VF-3 replaced their F2A-1s with newer F2A-2s and the F2A-1s were returned to Brewster. Eight of the F2A-1s were remanufactured to F2A-2 standards and during June of 1941 were re-issued to VS-201, flying from the escort carrier USS LONG ISLAND. By mid-1941 only one F2A-1 (BuNo 1393) remained in service, assigned to a training squadron where it would remain until May of 1944.

**XF2A-1  
(Early)**



## Cowling Development

**F2A-1**







During August and September of 1940, VF-3 painted a number of aircraft in experimental camouflage schemes based on proposals from artist McClelland Barclay. This F2A-1, equipped with a detachable gun camera on the forward fuselage just below the antenna mast, is believed to be painted in dirty Sea Green, Mid-Gray, and Off-White undersurfaces.

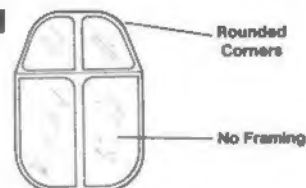
This F2A-1 is painted in a Barclay camouflage scheme believed to be Black, Silver Gray, and White with a Dark Gray wing. The camouflage trials board determined that the scheme was not particularly useful and recommended adopting an overall Non-specular Light Gray paint scheme pending further research.



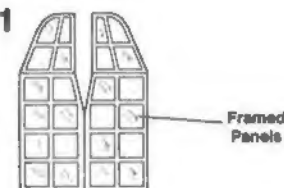
Although most F2A-1's were later brought up to F2A-2 standards, BuNo 1393 remained in the F2A-1 configuration. During 1941 "1393" carried an overall Non-specular Light Gray scheme with oversized national insignia on the wings. Pilots often preferred to fly with the canopy open, having trained on open cockpit biplanes.

## Ventral Window

XF2A-1

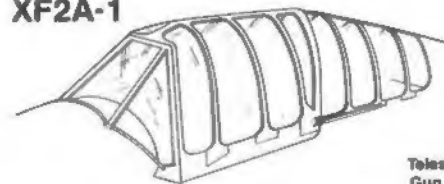


F2A-1

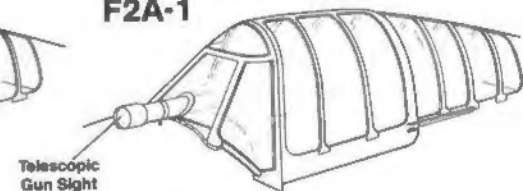


## Cockpit Canopy

XF2A-1

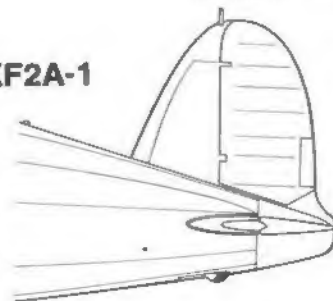


F2A-1

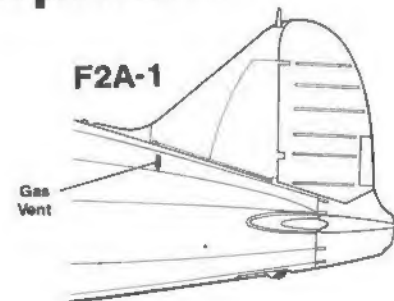


## Fin Development

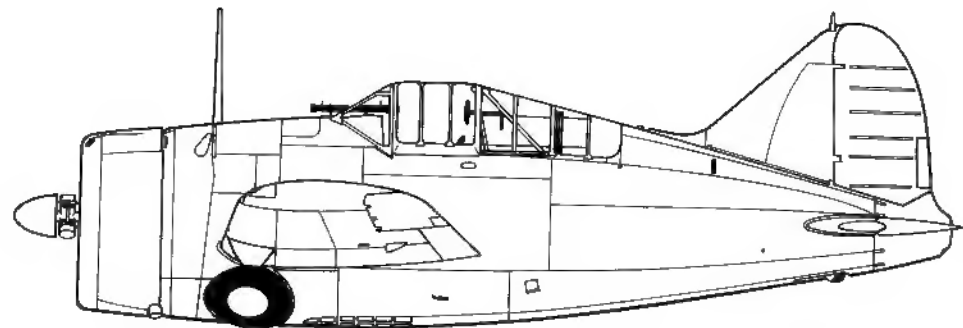
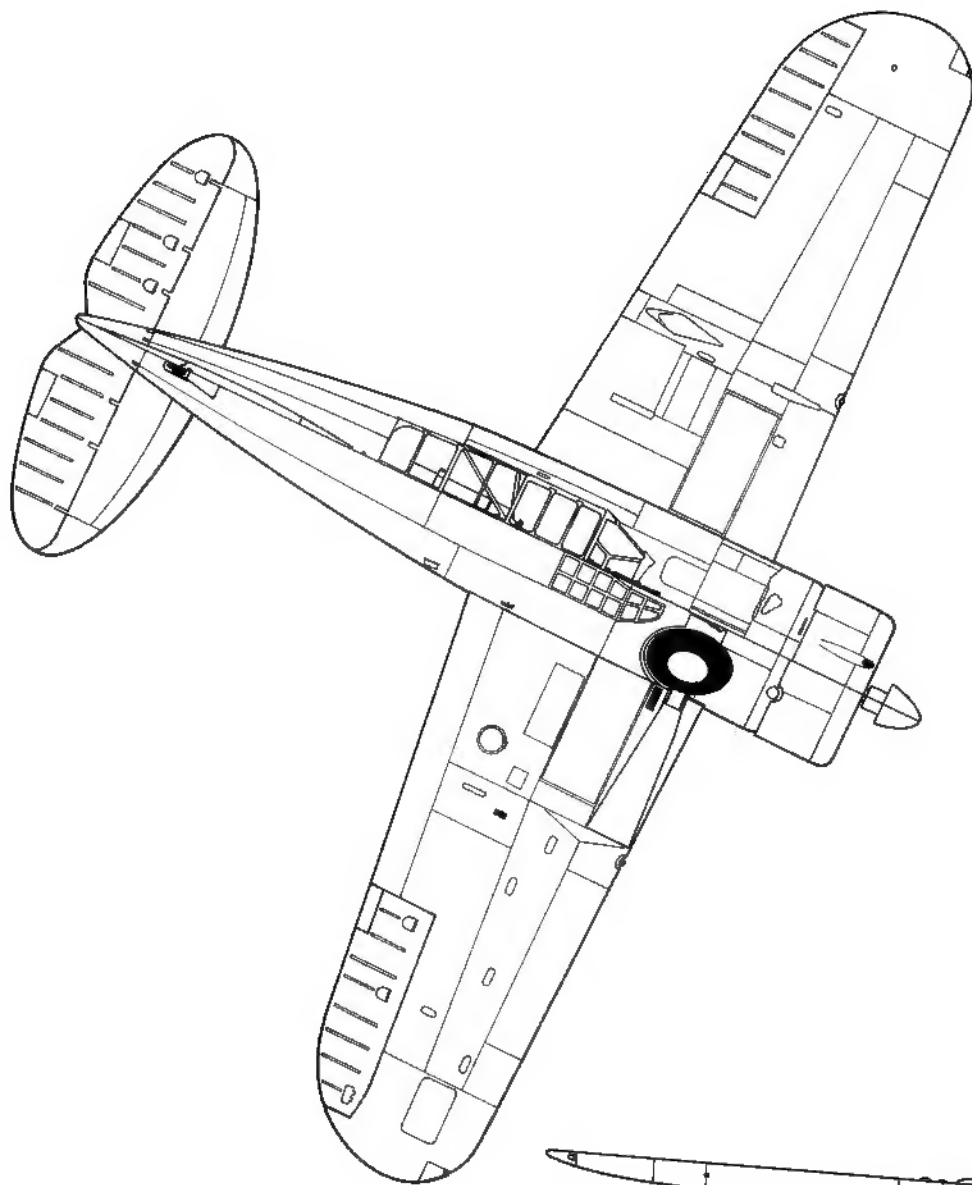
XF2A-1



F2A-1



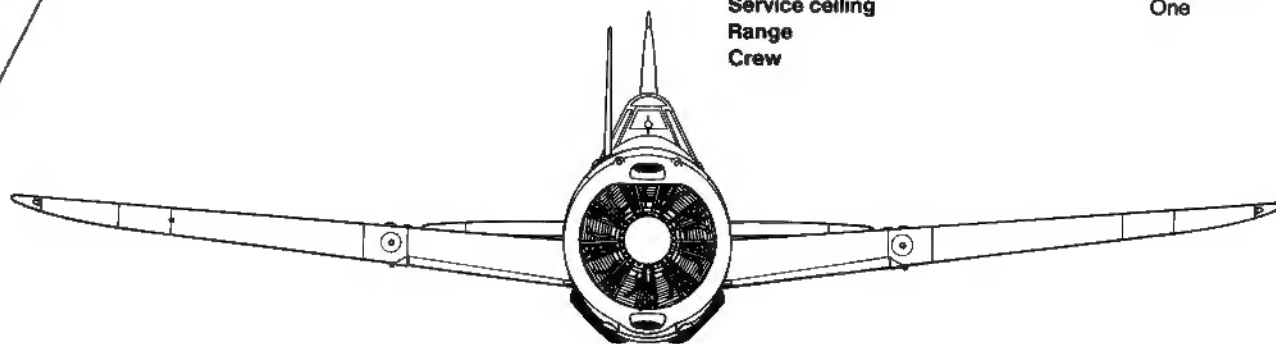




## Specifications

### Brewster F2A-1 Buffalo

|                 |   |
|-----------------|---|
| Wingspan        | 35 feet   |
| Length          | 26 feet   |
| Height          | 11 feet 11 inches   |
| Empty Weight    | 3,785 pounds  |
| Maximum Weight  | 5,040 pounds  |
| Powerplant      | One Wright R-1820-34 rated at 950 hp                      |
| Armament        | One .30 caliber and one or three .50 caliber machine guns |
| Performance     | 311 mph @ 18,000 feet                                     |
| Maximum Speed   | 33,000 feet   |
| Service ceiling | 1,000 miles   |
| Range           | One   |
| Crew            |   |





# Model 239 Finland

During early 1939 European governments realizing that war in Europe was imminent began seeking foreign made aircraft. While Brewster's manufacturing capacity was barely adequate to meet US Navy needs, the Brewster's sales team, eager to expand into foreign markets began negotiations with a number of European nations offering the basic F2A airframe with the naval equipment deleted.

During September of 1939 the US State Department was approached by a representative of Finland seeking permission to purchase American combat aircraft. Finland was one of the few nations to have re-paid its World War One debt to the United States and was highly regarded in Washington. When Finland was suddenly attacked by the Soviet Union on 30 November 1939, the United States quickly announced its willingness to allow Finland to purchase American fighter aircraft. Brewster, with State Department and Naval approval, diverted forty-three F2A-1s from US Navy production to Finland with the provision that the F2A-1s would be replaced with an equivalent number of later model F2As at a future date. Brewster assembled one additional aircraft from spare parts intended for the Navy order and eventually delivered forty-four machines to Finland under the export designation Model 239.

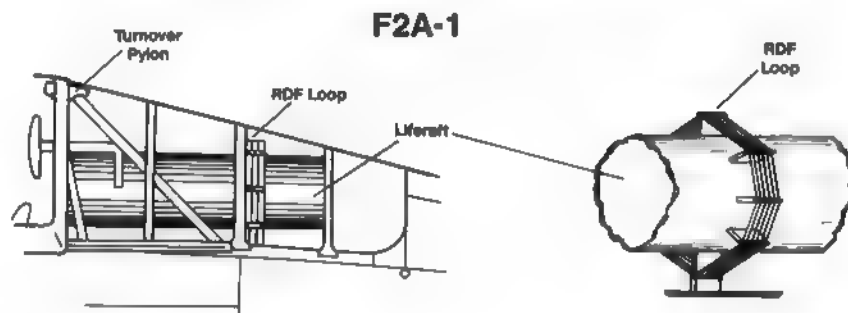
The Brewster Model 239 was a de-navalized variant of the standard Navy F2A-1. The tailhook, life raft, and catapult equipment were removed, the telescopic gun sight was replaced by a ring and bead sight, and the Wright R-1820-34 engine was replaced with an export approved 950 hp Wright 1820G-5 Cyclone. The Navy Radio Direction Finding (RDF) antenna was replaced by a simplified RDF antenna mounted in the rear cockpit. Armament consisted of one .30 caliber and one .50 caliber machine gun mounted in the cowl and two .50 caliber machine guns mounted in the wings.

Initial deliveries of the Model 239 (Finnish serial numbers BW-351 to BW-394) began during February of 1940. The Brewsters were shipped to Trollhattan, Sweden where the Model 239s were assembled by Norwegian Air Force mechanics under the supervision of Brewster engineers. After flight testing and cold-weather preparations the Model 239s were ferried to Finland by both American and Finnish pilots. The Finns planned to assign the Brewsters to a squadron made up of international volunteer pilots; however, The Model 239 was a denavalized variant of the F2A-1 for Finland. The tail hook and telescopic gun sight have already been removed from this Model 239 and the life raft will also be removed before shipment. Flight tests for the Model 239 was conducted at Roosevelt Field on Long Island, New York.

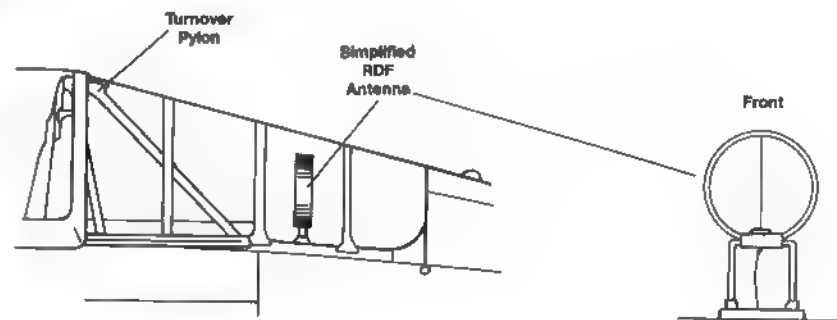


The Brewsters arrived in Finland too late for use in the "Winter War" between Finland and the Soviet Union. This Silver lacquered Model 239 carries the Mid-Blue Finnish swastika in six positions and has the simplified RDF loop antenna installed in the rear cockpit.

## RDF Antenna Installation



## Model 239





only six had reached Finland by the time the Russo-Finnish 'Winter War' ended on 13 March 1940.

During the year of uneasy peace that followed, the Finns made a number of modifications to the Model 239 including an the installation of armored headrest and seat back, and a reflector gun sight was installed in place of the ring and bead sight. An experimental ski landing gear for operations from snow covered airfields was developed, but the fixed skis severely degraded performance and were rarely used operationally. Model 239s were assigned to *Lentolaivue 24* (LeLv 24), and organized into four flights of eight aircraft each with the remainder held in reserve.

The Finnish pilots of LeLv 24 were all combat veterans and immediately began training on their new aircraft. Finnish pilots found the Model 239 to be very maneuverable at low level and nicknamed their new craft the *Taivaan Helmi* (Sky Pearl). The squadron was fully prepared and at a high state of readiness when Germany invaded Russia on 22 June 1941. Finland (now a co-belligerent allied with Germany against the Soviets) again went to war with Russia on 25 June 1941 after Soviet bombers began raids against targets along the Finnish border, in what would become known as the 'Continuation War'.

The German offensive on the Central and Southern fronts prevented the Soviet Air Force from deploying large numbers of first line aircraft to the Northern front and during the first few months of the war, LeLv 24 maintained a degree of air superiority. During August and September the Soviets began reinforcing their forces in the North to counter Finnish advances near Lake Ladoga — the 'back door' to the vital Soviet city of Leningrad. Unknown to the Russians the Finns, despite German political pressure, had refused to take part in an attack on Leningrad and were content to recapture their territory lost to the Russians during of the 'Winter War'. LeLv 24 moved to forward bases along the Russian frontier and began flying ground attack missions supporting Finnish forces attempting to cut the Murmansk railway in order to halt the flow of Lend-Lease equipment arriving through the port of Archangel.

During the Winter and early Spring of 1942 LeLv-24 moved constantly, both to provide air defense for Helsinki and to support Finnish ground forces. The Russians usually avoided combat with the Finns but when more modern Soviet fighters became available during the late Summer, they became bolder. LaGG 3s, Yak 1s, Yak 7s, Lend-Lease Hawker Hurricanes, Curtiss P-40s and Bell P-39s were now met in combat, but the Soviet pilots lacked the training and experience of the Finns. During an engagement on 18 August 1942, Model 239s of 1/LeLv 24 led by the Finnish ace LT Hans Wind, encountered a formation of sixty Soviet aircraft northwest of Leningrad. Joined by another flight This Model 239 is fitted with a waterproof engine cover to protect the engine from the extreme cold of the Finnish winter. The Navy style solid rubber tail wheel has been encased in a canvas boot to protect it from damage by rocks and ice during operations from land bases.



This Buffalo of 2/LeLv 24 has been camouflaged with Black and Green upper surfaces over Silver lacquer undersurfaces. The outline surrounding the fuselage serial numbers are unpainted areas of the original Silver finish. The canopy frames are Silver and the individual aircraft number is White carried on a Black rudder.

of Brewsters, the Finns were able to destroy fifteen Soviet aircraft for the loss of one Model 239. Among the squadron's pilots were some eighteen aces, many of whom were multiple aces. The high scoring Brewster 239 ace was LT Hans Wind who scored thirty-nine of his seventy-five kills flying the Buffalo. Finland's top scoring ace, Warrant Officer Eino Juutilainen, scored thirty-four of his ninety-four victories while attached to LeLv 24 flying Buffalos.

During late 1942 and early 1943 maintenance for the Model 239 had become a serious problem. Aligned with Germany, Finland had lost access to American spare parts and keeping the Brewsters operational was a constant struggle. In an attempt to ease engine maintenance problems at least six Model 239s were equipped with captured Russian M-63 engines (a license built version of the Wright Cyclone). The Finnish State Aircraft factory also began development of a Model 239 variant with plywood wings and captured Soviet engines. In the event the program did not progress beyond the building of one prototype named the *Humu*. Performance of the prototype was slightly better than the stock This Model 239 of 4/LeLv 24 was flown by Flight Commander, CAPT Sovelius, who scored seven victories in this Brewster during late 1941. The cowlings and fuselage band are Yellow. The Black number on a White rudder are identification markings of 4/LeLv 24, and the White outline Lynx is the squadron insignia.





This Brewster of 2/LeLv 24 is equipped with the rarely used fixed ski landing gear for operations from snow covered air fields. The landing gear could not be retracted when skis were installed and the drag severely degraded the Model 239s performance.

Model 239, however, endurance and armament had been reduced

During May of 1944, LeLv 24 re-equipped with German supplied Messerschmitt Bf 109G-2s and the surviving Brewsters were transferred to *Havittajalentolaiveu 26* (Fighter Squadron 26) HLeLv 26 was based north of Leningrad on the west shore of Lake Ladoga when the Soviets began their 1944 offensive and although HLeLv 26 continued to score victories, the Soviets had deployed large numbers of high performance fighters and losses began to increase. HLeLv 26 continued to fly the Model 239 until the armistice was signed with the Soviets on 4 September 1944, ending the Continuation War. Under the conditions of the Armistice, Finnish forces were responsible for driving the Germans from Finnish territory. The Brewsters were flown against the retreating Germans in Lapland, scoring several kills against Ju 87 Stukas in January of 1945.

During its combat career in Finland the Buffalo is credited with 496 enemy aircraft destroyed against the loss of nineteen Buffalos, for a victory ratio of 26:1. After five years of combat and attrition only eight Brewsters remained in Finnish inventory and were used in the training role until late 1948, more than ten years after the XF2A-1's first flight.

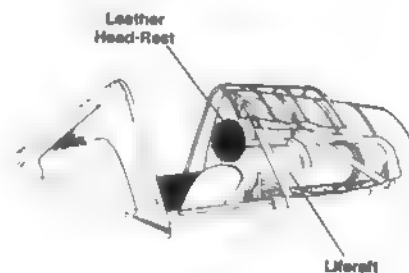
Ens. L. Nissinen, a Finnish ace who would later score twenty-two and a half victories flying the Brewster, rests on the tail of his Model 239. Fifteen and a half victory markings are painted on the fin in the form of White frontal silhouettes of the aircraft shot down.



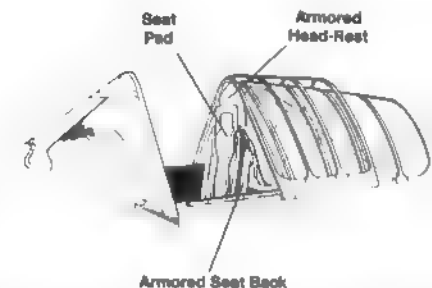
The pilot of this Model 239 is greeted by his ground crew and fellow pilots after returning from a mission. The dark panels under the outboard wings are Yellow recognition markings required by the *Luftwaffe* for all aircraft operating on the Eastern Front.

## Armored Seat and Head-Rest

F2A-1



Model 239



This Model 239 carries the serial number painted in Black against the Green camouflage and in Green against the Black camouflage. Five victory markings are carried on the fin, including one against a Soviet I-153 biplane fighter.



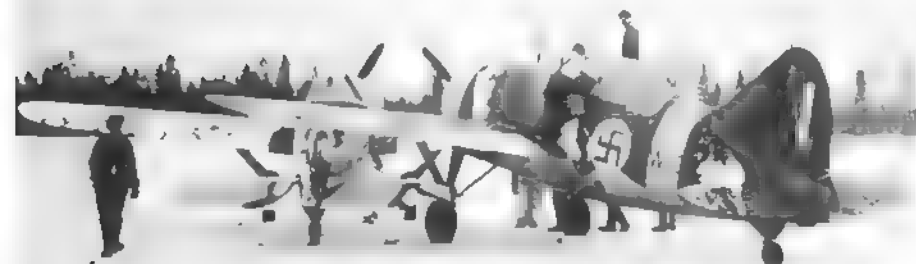




(Above) This Buffalo carries the Red-White-Red spinner, White rudder, Black tail numbers and White Osprey insignia of 4/LeLv 24. The original Silver undersurfaces have been repainted in Light Blue, a change implemented on all Brewsters during late 1942.



(Above) These three Brewsters of 2/LeLv 24 on patrol over Soviet territory during the Autumn of 1942 carry a Black *Farting Elk* insignia on the lower forward fin. The Buffalo in the foreground carries twelve and a half victory markings and is believed to be piloted by Warrant Officer Kinnunen, another ace assigned to LeLv 24.



Finland's top scoring ace, Warrant Officer Juutilainen of 3/LeLv 24, poses by his Model 239 Yellow '4' with twenty White victory markings painted on the fin. Warrant Officer Juutilainen compiled thirty-four of his ninety-four victories flying the Brewster.

## Gun Sight

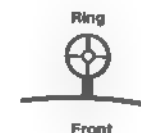
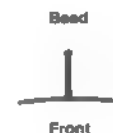
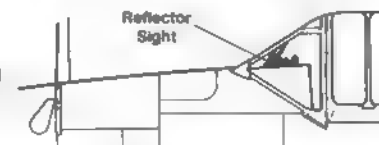
F2A-1



Model 239  
(Early)



Model 239  
(Late)



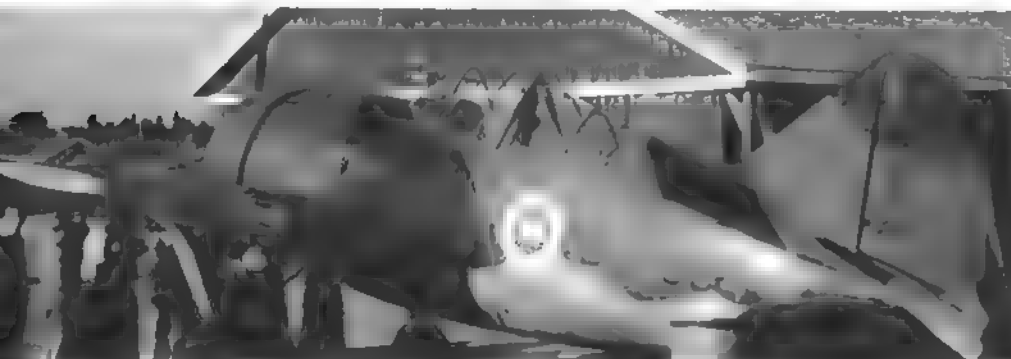
(Right) These Model 239s collided on a snow covered airfield during March of 1943 but the damage appears to be minor. Both aircraft carry different styles of temporary White winter camouflage painted directly over the original Black and Green camouflage. BW-371 carries the Mid-Blue rudder and White aircraft number of 1/LeLv 24.



(Above) These two Model 239s of 1/HLeLv 26 carry the revised nose recognition markings adopted by the Finns during 1944; camouflage paint was added to the upper half of the engine cowling while the underside remained Yellow.



A presentation aircraft, BW-355 carries the name 'NOKA' in White on the fuselage below the windscreen. During September of 1944 Finland signed an armistice with the Soviets and removed the Yellow Eastern Front recognition markings from their aircraft.



(Left) Another 'NOKA' presentation aircraft carries the post war Finnish national insignia, a White-Blue-White roundel. A number of surviving Buffalos would continue to be used in training roles until September of 1948.



(Below) The Finnish State Aircraft Factory attempted to develop a Finnish produced Buffalo, but the project did not progress beyond a single prototype. The 'Humu' prototype mated a Model 239 fuselage, captured Russian M-63 radial engine, and plywood wings. The 'Humu' prototype has been restored and is believed to be the only example of a Buffalo variant remaining in the world today.



# F2A-2

By the Fall of 1939 the Navy had completed tests with the XF2A-2 prototype, but when the bulk of F2A-1 production was released to Finland, the Navy modified its contract with Brewster to replace the F2A-1 with the more powerful F2A-2. The modified contract called for production of forty-three F2A-2s (BuNos 1397 through 1439) and the remanufacture of eight F2A-1s to F2A-2 standards.

The F2A-2 featured a number of improvements over the F2A-1. The 950 Hp Wright R1820-34 engine was replaced with a 1,200 hp Wright R-1820-40 engine. The new engine added some 350 pounds to the aircraft and to maintain the center of gravity the fuselage was shortened five inches ahead of the wing. The cowling was slightly enlarged and the frontal opening was re-configured to improve engine cooling. A cuffed Curtiss Electric propeller replaced the Hamilton Standard propeller and a larger propeller spinner was installed. The engine exhaust stubs were relocated from the lower portion of the cowling to a position at the rear of the cowling almost even with the wing root. The ventral window framing was reconfigured to improve downward visibility — with two oval shaped panels installed in the rear frames. The small rectangular gas vents on the fuselage below the vertical tail were replaced by a series of vents installed on the fuselage just above the leading edge of the wing. Armament was four Browning M2 .50 caliber machine guns, two mounted in the fuselage and two installed in the wings. Provisions were also made for the installation of bomb racks capable of carrying 100 pound bombs under the wings just outside the main landing gear. The F2A-2's top speed was 344 mph at 16,500 feet.

The Navy expected their first F2A-2s quickly but political considerations again interfered. Belgium had appealed to the US State Department to allow Brewster to produce the Belgian Model 339B (a land based equivalent of the F2A-2) ahead of the Navy F2A-2s. The Navy reluctantly agreed and six months later, during September of 1940 Navy F2A-2s finally began to emerge from Brewster's Newark final assembly plant. Production continued uninterrupted with the last Navy F2A-2 being delivered during December.

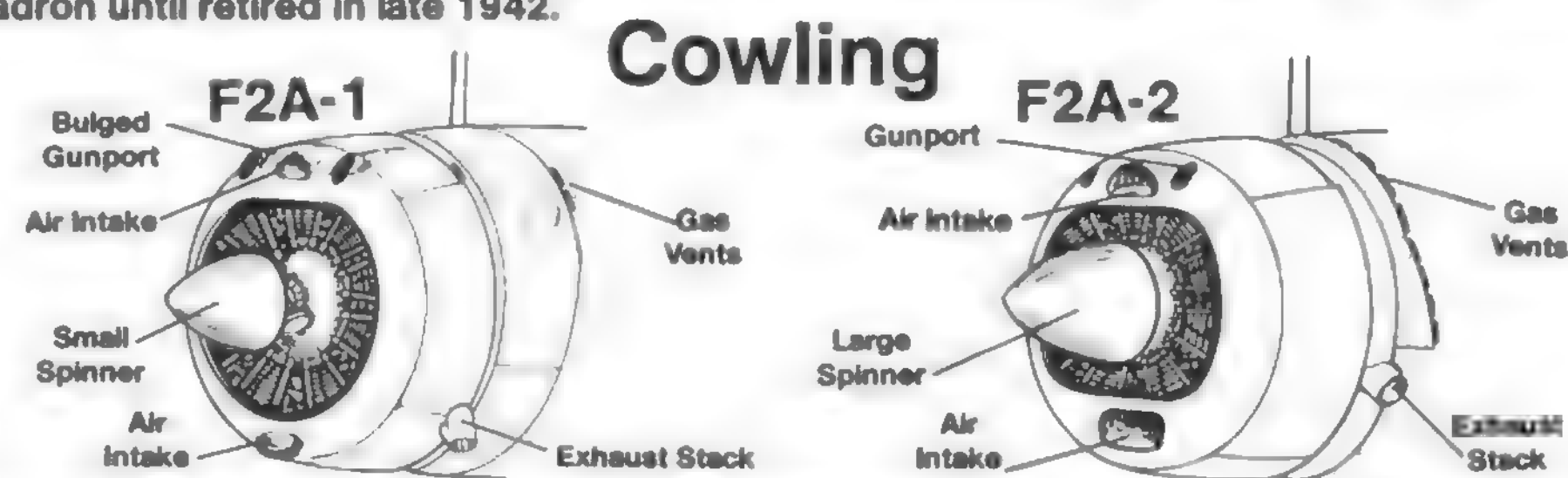
Fighting Squadron Three (VF-3) and Fighting Squadron Two (VF-2) were re-equipped with the F2A-2 during early 1941. Many VF-2 pilots were non-commissioned Naval Aircraft Pilots (NAPs) and the squadron's emblem, a Chief Petty Officer's rating badge was painted on their F2A-2s just under the cockpit. The Flying Chiefs of VF-2 transitioned to the F2A-2 from vintage Grumman F2F biplanes and were impressed with their new high-speed monoplanes. The two squadrons, operating from USS SARATOGA and USS LEXINGTON, immediately began training and experimenting with new tactics based on combat reports emerging from the European war.

VF-2 Buffalos were unique in that they modified their F2A-2s replacing the tall fuselage mounted radio antenna mast with a short stub mast bolted to the port wing reducing vibration and drag caused by the tall fuselage mast. VF-2 was the only squadron to so modify their aircraft.

Both squadrons experienced comparatively few difficulties introducing the F2A-2 into fleet service but two problems surfaced that would continue to plague the Buffalo during its entire service career. The Wright Cyclone engine experienced flaws in the bearings requiring frequent overhauls; and landing gear failures were common. VF-2 pilots reported that the gear legs were often jarred slightly out of alignment during carrier landings. The next time the aircraft was flown the landing gear leg would scrape the wing well and the gear door would not fully close. When the pilots complained to the crew chief, a quick fix was made — by slightly filing down the rivets on the landing gear leg the gear door would close. Repeated several times, however, this soon resulted in weakened rivets and eventual landing gear failure. A further problem with the landing gear was identified in the hydraulic extension struts, which were too weak to withstand repeated deck landings. Brewster re-designed and built reinforced struts which solved this problem but landing gear failures would never be completely eliminated.



The XF2A-1 prototype was returned to Brewster for installation of the more powerful 1,200 hp Wright 1820-40 engine and re-designated the XF2A-2. After high speed diving trials, the prototype would eventually be brought to full F2A-2 standards and assigned to a training squadron until retired in late 1942.



This F2A-2 (BuNo 1398) of Fighting Squadron Three (VF-3) is fitted with bomb racks for 100 pound bombs under the wings outboard of the landing gear legs. The F2A-2 featured a redesigned cowling for the 1,200 hp Wright 1820-40 engine and a cuffed Curtiss Electric propeller with a large spinner.





Veronica Turner, 'Miss Brewster, 1940' poses in the cockpit of an F2A-2 of VF-2, the 'Flying Chiefs'. The squadron insignia, a Chief Petty Officer's rating badge, is carried on the fuselage under the windscreen. The landing gear is fitted with metal guides to protect the oleos from damage in the event of a barrier landing.

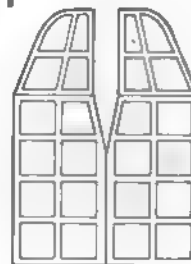
The F2A-2 provided Navy pilots with an introduction to monoplane fighters in the period leading up to the Second World War. During September of 1941, the Navy began replacing their F2A-2s with later variants and F2A-2s were then used as initial equipment for the rapidly expanding Marine Corps air arm or as advanced trainers. The F2A-2 was considered by many Navy pilots to be the best Buffalo variant, with few of the engine and weight problems which would plague later variants



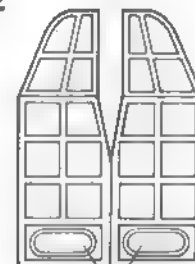
This F2A-2 of VF-3 is the second production F2A-2 and is painted in the factory applied pre-war color scheme of overall Silver with Chrome Yellow upper wing surfaces. The SARATOGA air group painted the tail and upper cowling surfaces White. VF-3's 'Felix the Cat' insignia is carried just below the windscreen.

## Ventral Window

F2A-1



F2A-2

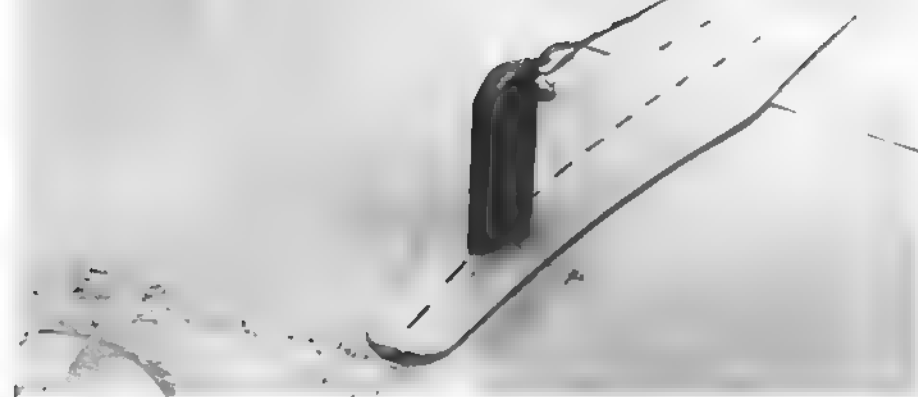


Oval Shaped Panels

This F2A-2 assigned to VS-201 is one of eight F2A-1s rebuilt by Brewster during late 1940 and early 1941. '201-S-13' carries the overall Light Gray color scheme adopted during early 1941. The national insignia is carried on the upper port wing, lower starboard wing, and on the rear fuselage. All numbers and letters were painted in White.



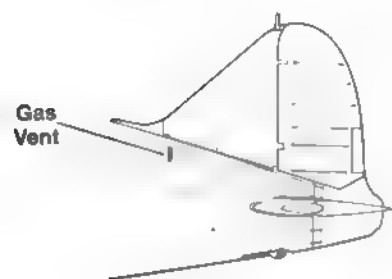




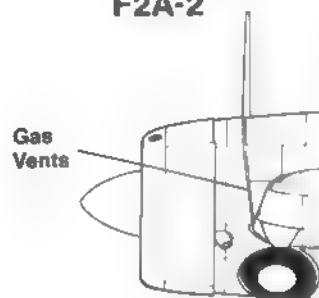
VF-2 replaced the tail fuselage mounted radio antenna mast with a short antenna mast bolted to the port wing. During early 1941 the squadron modified all their F2A-2s, eliminating the drag and vibration caused by the tail mast.

## Gas Vents

F2A-1



F2A-2

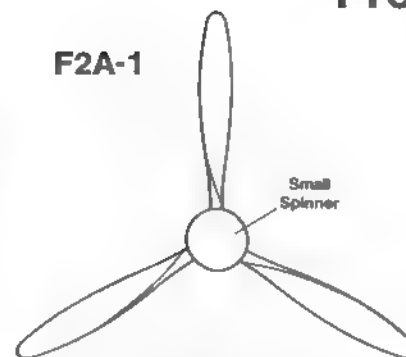


F2A-2 of VF-2 carries the Lemon Yellow tail surfaces of LEXINGTON's air group, and the True Blue cowling, fuselage band, and wing chevrons, the 3rd Section's assigned recognition color. The tall radio antenna mast has been replaced with a short stub mast bolted to the port wing.



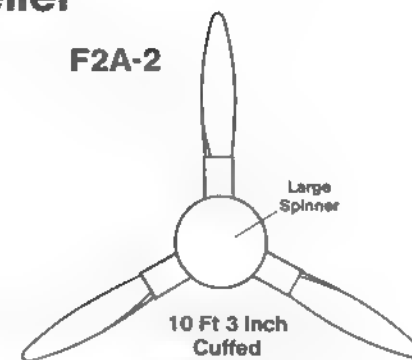
## Propeller

F2A-1



9 Ft Hamilton Standard

F2A-2



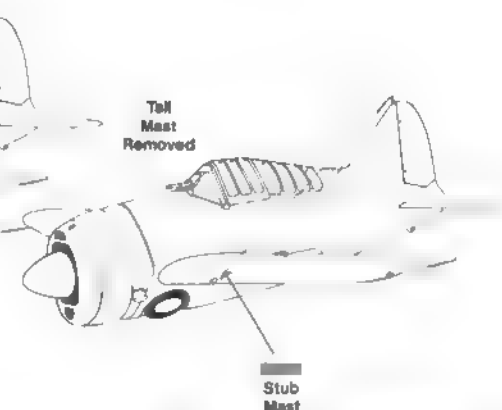
10 Ft 3 Inch  
Cuffed  
Curtiss Electric

## VF-2 Antenna Mast Modification

F2A-2



VF-2 F2A-2



F2A-2's were used as initial equipment for newly formed U.S. Marine Corps fighter squadrons. This F2A-2P (modified with a ventral reconnaissance camera) served with VMF-112 at San Diego during mid-1942. This crash landed Buffalo is painted in Non-specular Blue-Gray over Light Gray camouflage.







# Model 339B

## Belgium

During the Summer of 1939 Belgium urgently needed new fighters to replace their obsolete Fairey Fox biplanes, and placed a contract with Brewster for forty export variants of the F2A-2. The German invasion of Poland during September of 1939 led the Belgians to appeal to the US State Department to allow production of their contract ahead of the US Navy. The Navy reluctantly agreed to the State Department request for priority and production of the Belgian Model 339B began during early 1940.

The Brewster Model 339B was essentially a de-navalized variant of the F2A-2. The catapult gear, life raft, RDF antenna, and tailhook were deleted. The 1,200 hp Wright R1820-40 engine was replaced by an export approved 1,100 hp Wright R1820-G105 driving a Curtiss Electric cuffed propeller. The Model 339B featured a pointed tailcone that faired over the tailhook opening, increasing the fuselage length slightly. The retractable naval style tail wheel was retained and protected by a canvas boot. The straight pitot tube on the starboard wing was replaced by an 'L' shaped pitot tube.

Armament for the Belgian contract was to be customer supplied and installed after delivery. Provisions were made for installation of two .50 caliber machine guns in the fuselage and two .50 caliber machine guns in the wings. The Navy telescopic gun sight was replaced by a simplified fixed post gun sight.

Painted in Belgian camouflage of Dark Earth and Dark Green over Silver lacquer and carrying Belgian roundels, the initial example of the Model 339B rolled off the assembly line during April of 1940 and was immediately shipped to Belgium. Unfortunately, the German Blitzkrieg during May of 1940 overran the Low Countries and the ship carrying the crated Brewster was diverted to France, arriving at Bordeaux on 28 May 1940. The aircraft was subsequently captured by the Germans and is believed to have been assembled and test flown by the *Luftwaffe*.

The next six Model 339Bs off the production line were rushed across the Canadian border and loaded aboard the French aircraft carrier BEARN which was in Halifax loading Curtiss SBC Helldivers and Hawk 75A-4s purchased for the *Armee de l'Air*. The carrier sailed on 16 June 1940 and was in mid-ocean when France fell. The convoy was diverted to the Caribbean island of Martinique, a French possession, where the aircraft were unloaded and parked in a field waiting for the political situation to stabilize. During mid-September, it appeared that the French Vichy regime might become an active Axis ally and the U.S. State Department became seriously concerned over the presence of potentially hostile aircraft in the vicinity of the vital Panama Canal. Political pressure was brought to bear on the Vichy ambassador to have the aircraft either disabled or moved to Indochina. Unknown to the French, six Douglas B-18 bombers of the USAAF's 25th Bombardment Group were stationed on nearby Antigua Island, with orders to bomb both the aircraft and French shipping if Martinique became a threat. The crisis was resolved when Washington was informed that Martinique Island had no airfield and all of the aircraft were permanently grounded. The Buffalos and the French owned

The first Belgian Model 339B on a test flight over the Atlantic shortly before being shipped to Europe carries the U.S. civil registration 'NX-56B' applied with broad tape on the wing upper. This aircraft would later be captured by the Germans at Bordeaux, France.



The Belgian Model 339B featured a pointed tailcone which lengthened the Buffalo's fuselage slightly. The carrier style tail wheel and cuffed Curtiss Electric propeller of the F2A-2 have been retained, but the pitot tube has been replaced by an 'L' shaped pitot tube.



aircraft languished on Martinique until they were destroyed by explosives planted by 'unknown agents'.

The thirty-three remaining Model 339Bs of the Belgian contract were relinquished to the British by the Belgian government in exile. British Air Ministry serial numbers AS410-437, AX811-820, and BB450 were assigned to the Model 339Bs (including the six Model 339Bs on Martinique which the British tried unsuccessfully to obtain). The ex-Belgian Brewsters began arriving in Britain during July of 1940 and were fitted with British .303 calibre machine guns in the wings and 50 caliber machine guns in the fuselage. During October of 1940 a number of the Model 339Bs were assigned to No. 71 (Eagle) Squadron, manned by American volunteers, for training. The Eagle Squadron found the Model 339B unsuitable for European combat, lacking a reflector gunsight, protected fuel tanks, or redundant control cables. Additionally all the aircraft's instruments were in French! Trials flown by the British quickly led to a decision that the Brewster would only be used to equip overseas units.

Eighteen of the Model 339Bs were assigned to the British Fleet Air Arm (FAA) for operations in the Middle East. No. 855 Squadron briefly conducted deck trials with a number of ex-Belgian Buffalos aboard HMS EAGLE during March of 1941. Without tailhooks, the Buffalos engaged the carrier's slack arresting cables with their landing gear, an arrangement that was found to be totally unsatisfactory and further trials were discontinued. A number of Model 339Bs were stationed on the island of Crete with No. 805 Squadron, but the day before the German invasion of 20 May 1941, all flyable aircraft were evacuated to Egypt. At least one Buffalo was abandoned on Crete and was captured by the Germans. Eventually the Brewsters were replaced by Grumman Martlets (the British F4F Wildcat variant) and during mid-1941 the survivors were relegated to airfield hacks or instructional airframes for training mechanics.



These five Belgian Model 339Bs parked on the ramp outside the Brewster assembly hanger at Newark airport all carry US civil registrations on their rudders. Buffalo components built in the Queens, New York plant were trucked to Newark for final assembly and flight testing.

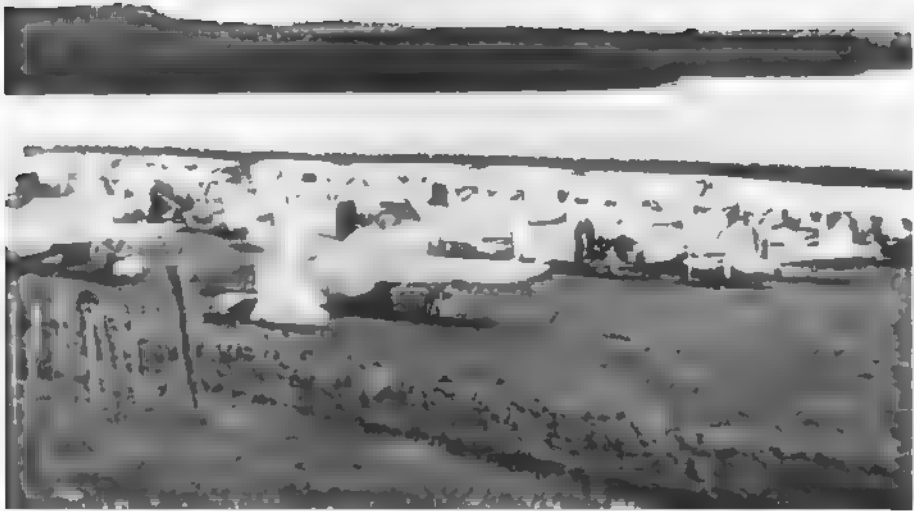
Brewster mechanics reposition a Belgian Model 339B on the ramp at the Newark final assembly plant. Model 339Bs were painted in Belgian camouflage of Dark Earth and Dark Green over Silver lacquer undersurfaces with Belgian roundels in six positions. The US civil registration codes are temporary markings carried during test and acceptance flights.



The Model 339B had a simple fixed post gunsight replacing the telescopic gun sight of the US Navy F2A-2. The heavy four-strut turnover pylon can be seen behind the pilot seat. The white insulator for the radio antenna wire lead-in is visible on the fuselage just below and to the rear of the canopy.

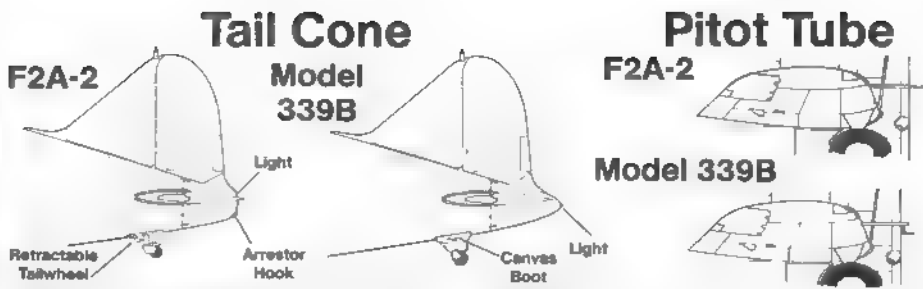






Belgian Model 339Bs, and French owned Curtiss Hawk 75s and SBC Helldivers share a hillside on Martinique. The Brewsters were on board the French aircraft carrier BEARN enroute to Europe when France fell and the ship was diverted to Martinique. All the aircraft would later be destroyed by 'unknown agents'.

Thirty-three Model 339Bs were relinquished to the British by the Belgian government in exile. A number of the ex-Belgian Model 339Bs were used by No. 885 Squadron for shipboard trials on board HMS EAGLE during March of 1941. The export Brewsters were not equipped with tailhooks and the landing trials were unsatisfactory.



No. 805 Squadron deployed a number of Model 339Bs to Crete during March of 1941. Before the German invasion, however, all flyable aircraft on the island were withdrawn to Egypt. This unserviceable Buffalo was abandoned by the retreating British and captured by the Ger-



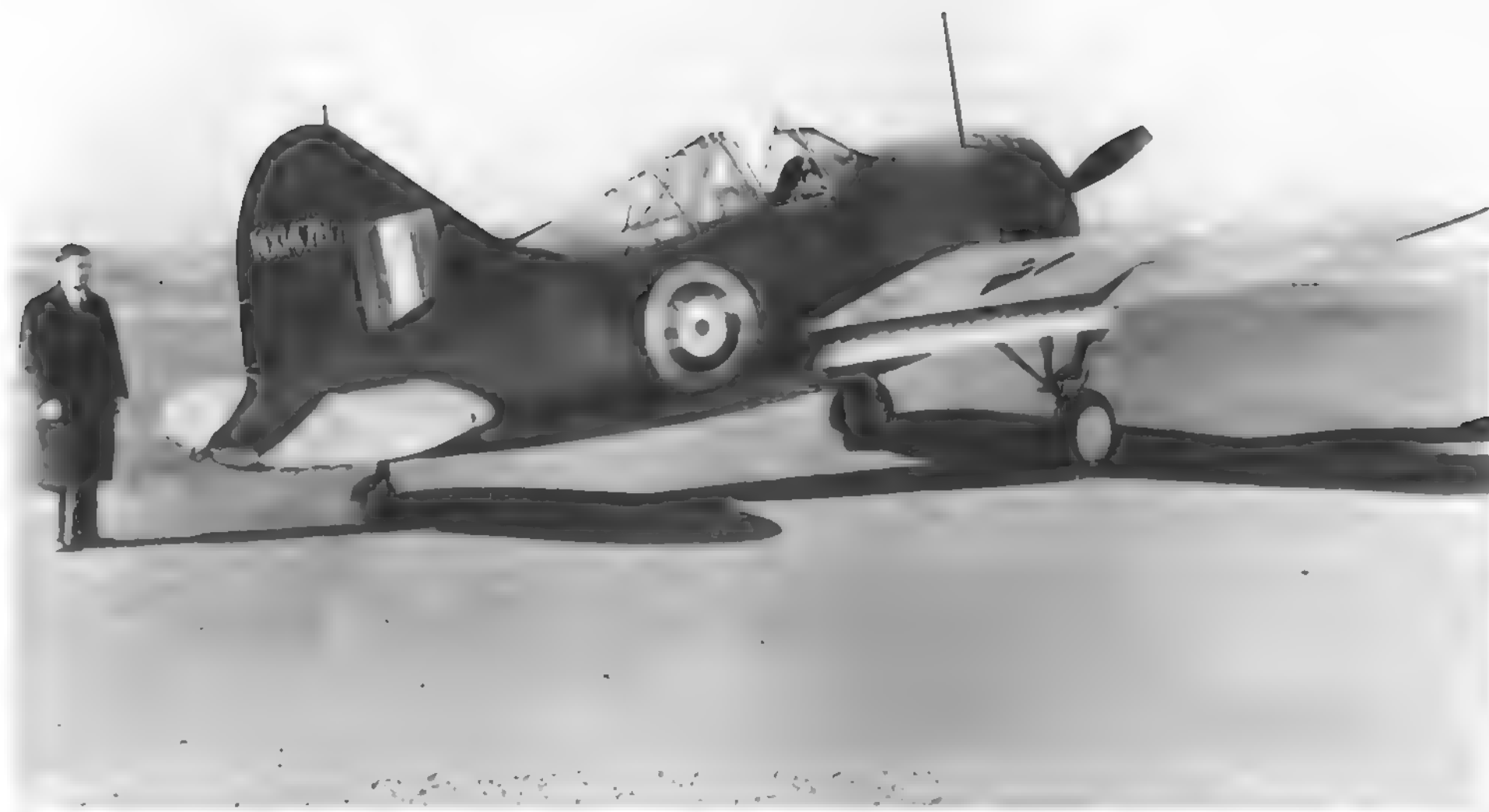
# Model 339E (Buffalo MK I) Great Britain

During January of 1940 the British government, realizing that British aircraft production would have to be supplemented by purchases from abroad, established the British Purchasing Commission in the United States. Among other orders, the Purchasing Commission placed two contracts with Brewster for a total of 170 Model 339Es, under the British designation Buffalo Mk I.

The Buffalo Mk I was also a denavalized variant of the basic US Navy F2A-2 with export modifications (no life raft, revised tailcone, deleted RDF antenna, and an export Wright Cyclone engine). The Buffalo Mk I also had a number of changes and modifications specified by the British Air Ministry to bring the Model 339E up to combat standards. The Curtiss Electric cuffed propeller was replaced with a 10 foot 1 inch Hamilton Standard propeller, a British Mk III reflector gun sight replaced the ring and bead sight, a second underwing landing light was added, armor plate was installed for the pilot, an armor glass panel was installed behind the windscreen, and provisions were made for flares. Brewster also changed the tail wheel, replacing the small retractable Naval style tail wheel with a larger fixed tail wheel better suited for operations from land bases. These and other internal changes brought the Buffalo's gross weight up to 6,500 pounds, 900 pounds heavier than a standard Navy F2A-2 with comparable armament. The increase in weight brought maximum speed down to 330 mph and lowered the rate of climb to 3,000 feet per minute with a service ceiling of 27,300 feet. The increased weight raised the Buffalo's wing loading, increasing landing speed (causing more problems with the landing gear) and decreased maneuverability.

The rapid growth in American aircraft production during 1940 caused a major problem within the industry. Wright, manufacturer of the Cyclone engine, was unable to keep pace with demand for the powerplant, and Brewster experienced constant difficulty satisfying export customers because of this chronic shortage of engines. The 1,100 hp Wright Cyclone 1820-G105 engine installed in the Buffalo Mk I was selected because sufficient quantities could be obtained to meet the first British contract. But when the British placed a second contract, Brewster was forced to purchase used Cyclones from airlines flying the Douglas DC-3. The used engines were returned to Wright for re-manufacture to 1820-G105 standards, but these re-manufactured engines would later prove to be a maintenance problem. The British Buffalo Mk I did not use the same fuel line pressurization equipment as the Navy F2A-2 and fuel starvation was often experienced above 18,000 feet. British pilots would later report having to furiously stroke the emergency fuel system hand pump — while engaged in combat.

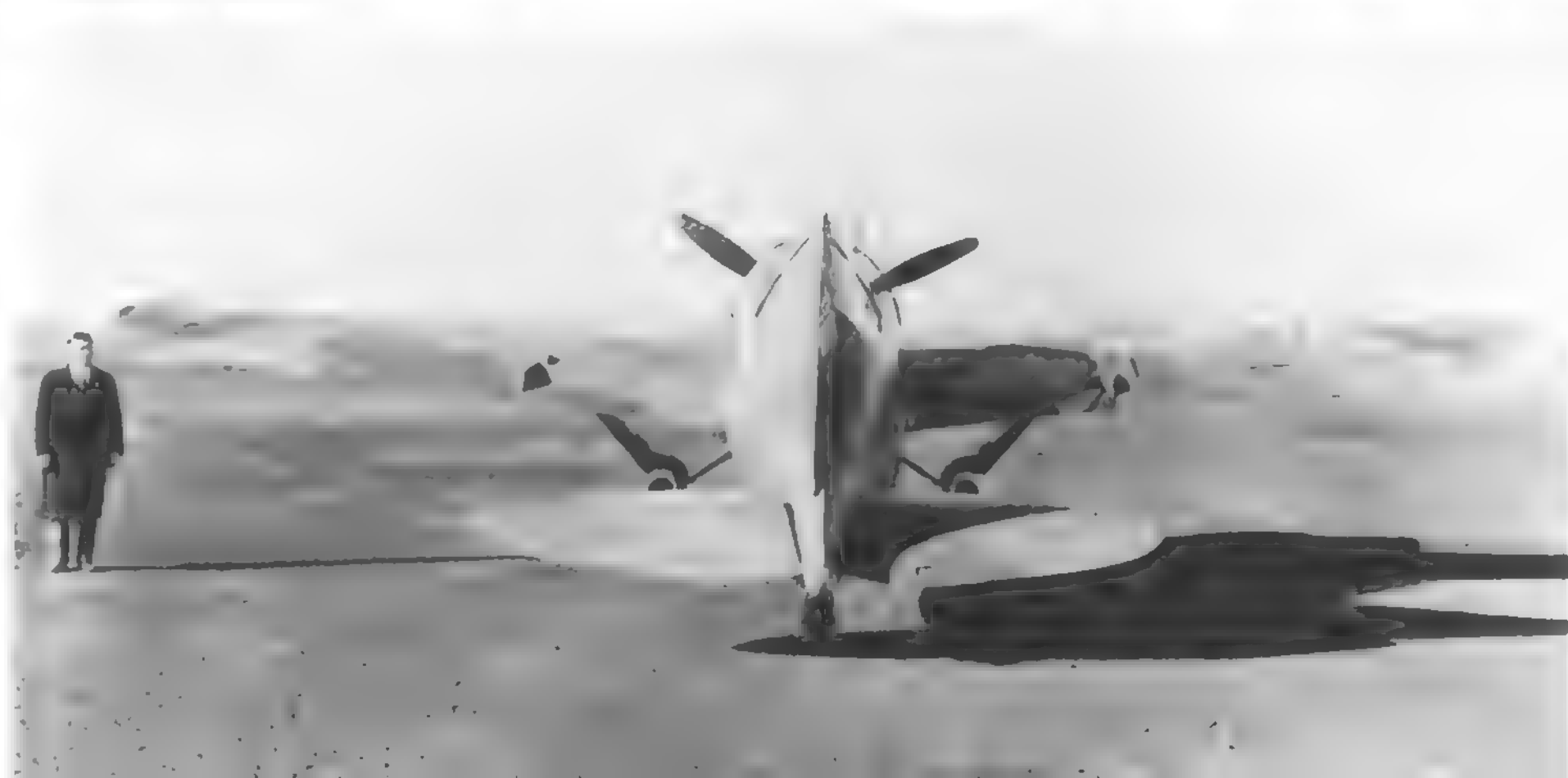
Buffalo Mk Is were assigned Royal Air Force (RAF) serial numbers W8131 through W8250 and AN168 through AN217. The first three aircraft off the Brewster production line (W8131 - W8133) were sent to Great Britain for development trials, arriving during April of 1941. The remainder of the British order was shipped directly to the Far East to reinforce the air defenses of the British possessions of Malaya, Singapore and Burma. As the Japanese threat had become more apparent the British built new airbases on the Malayan coast to counter an expected Japanese move into Thailand. When the first Buffalos began arriving in Singapore during the Spring of 1941, the British set into motion plans for form five Commonwealth fighter squadrons around the Buffalo. At least two of the newly arrived Buffalos were stripped of all armament and armor, and were modified with a camera mounted in the fuselage. These reconnaissance Buffalos were used to form No. 4 Photo Reconnaissance Unit Flight.



**The first production British Model 339E (serial W8131) was completed in early December of 1940. The Model 339E carried an armored glass panel behind the windscreen and the simple ring-and-bead gun sight on the nose would be replaced by a British Mark III reflector sight before delivery.**

During November of 1941, No. 67 Squadron RAF was stationed in Burma to protect the overland supply routes from Rangoon into India and China. Upon arrival in Burma the squadron received thirty-two Buffalos; with at least half held in reserve. Over 1,200 miles to the southeast, four additional Buffalo squadrons, Nos. 21 and 453 Squadrons of the Royal Australian Air Force (RAAF), No. 488 Squadron of the Royal New Zealand Air Force (RNZAF) and No. 243 Squadron RAF were stationed at the British naval base of Singapore and on the adjacent Malayan Peninsula. Each squadron was equipped with some fifteen aircraft. A shortage of pilots prevented the formation of additional squadrons, with a number of Buffalos being placed in storage. The Buffalo squadrons were all relatively new units with a only handful of experienced pilots — the rest were newly trained aircrews.

**The small blister below the White 'N' on the starboard wing is a cover for a wing-mounted gun camera. The Model 339E was the only Buffalo variant to feature an internal gun camera installation. The White civil registration is a temporary marking carried for flight tests and acceptance trials.**





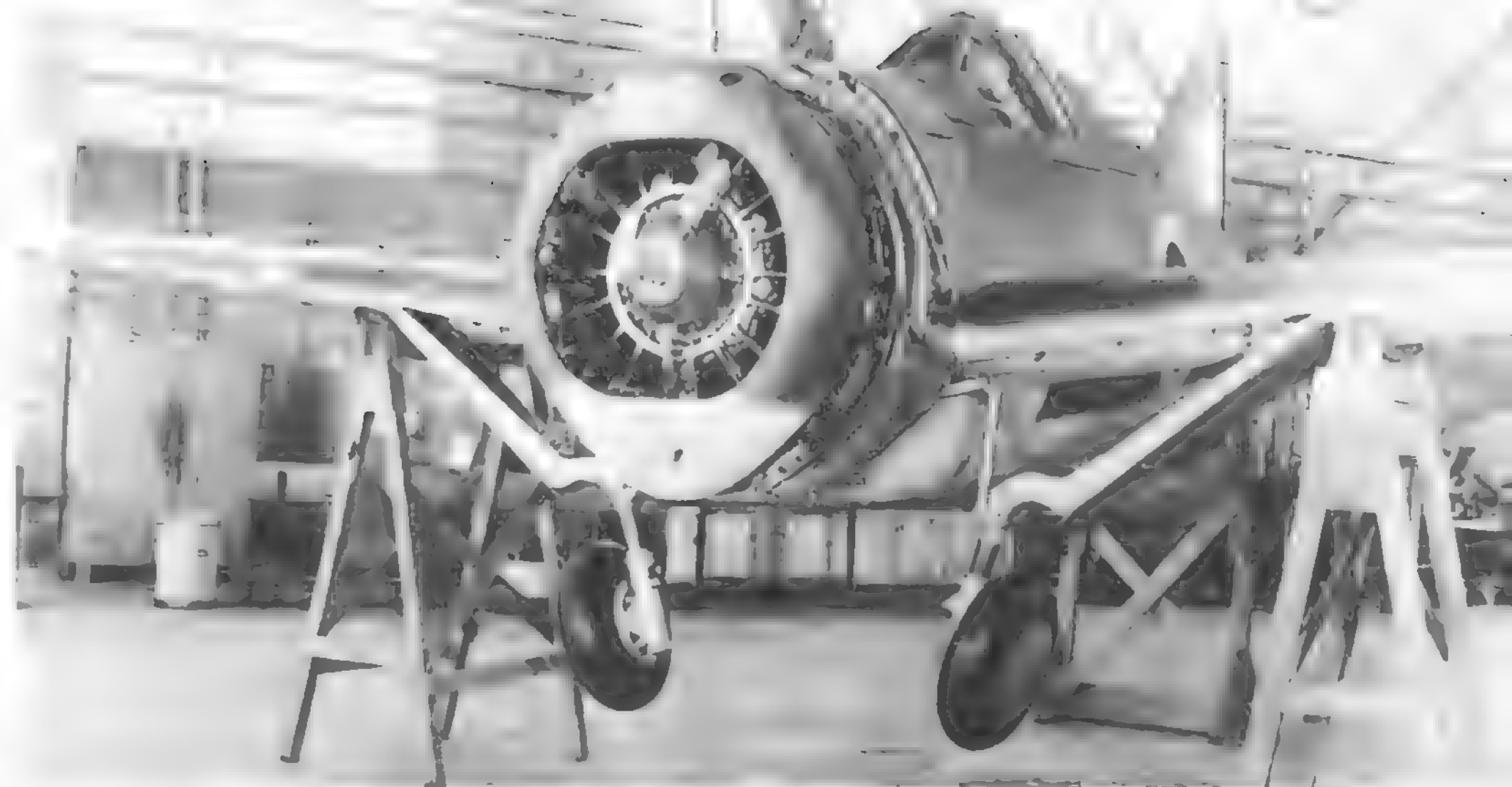
The Autumn of 1941 was spent in training and during this period some twenty (of 167 available) Buffalos were lost in accidents. Throughout their training the Commonwealth pilots were told that the Buffalo would prove to be more than a match for anything the Japanese could deploy against them. Repeated requests for Hawker Hurricanes to further reinforce Singapore were denied by British officials who stated that the Buffalo "...compared very favorably with the Hurricane and would be more than a "match" for Japanese aircraft..." The British Air Staff was apparently unaware that most allied fighters were totally outclassed by the Japanese Navy's Mitsubishi A6M2 Zero-Sen fighter.

War came to the British on 8 December 1941 (across the International Date Line in Hawaii it was 7 December) when Japanese Imperial Troops unexpectedly conducted a landing on the northeast Malayan coast. When the war broke out part of No. 243 Squadron was based at Kota Bharu, on the northeast coast of the Malay peninsula, with No. 21 Squadron directly across the peninsula on the west coast. The three remaining units (Nos. 453, 488 and a detachment of 243 Squadron) were at Sembawang and Kallang on the Island of Singapore. The Japanese rapidly expanded their beachhead and seized several of the newly built RAF airbases. The Buffalo fighter and Blenheim bomber squadrons were evacuated but large quantities of equipment and spare parts were lost.

Initially the Commonwealth squadrons had some success against Japanese Army Air Force units flying the Ki 27 Nate and Ki 43 Oscar. No. 453 Squadron RAAF is credited with destroying five enemy aircraft on 13 December and at least three Commonwealth pilots claimed five or more victories during the Malayan campaign. The odds, however, were decidedly against the Commonwealth squadrons and the Buffalo's shortcomings became painfully apparent when the pilots began meeting the Japanese Navy's Mitsubishi Zero in combat. The highly trained and combat experienced Japanese Navy pilots enjoyed the benefit of a faster, more maneuverable fighter equipped with heavier armament and were able to engage the Buffalo on their own terms. In an attempt to improve the Buffalo's maneuverability British ground crews removed all unnecessary equipment, sometimes replacing the .50 caliber machine guns with lighter .303 calibre weapons and reducing the ammunition and fuel loads, but these efforts could not overcome the performance gap between the Buffalo and the Zero.

The Buffalo squadrons were tasked with both air defense and ground support of British army units. The RAAF squadrons were exceptionally effective in ground attack and on 12 January 1942 a strafing attack against the advancing Japanese columns inflicted severe losses on the Japanese ground troops. But such efforts could not stop the deteriorating ground situation on Malaya and Commonwealth squadrons were forced to repeatedly withdraw southward until they were all operating from Singapore Island. Attrition of both aircraft and pilots gradually wore down the Buffalo squadrons until there were few Buffalos remaining airworthy. Finally, during February of 1942 the last airworthy Buffalos and a number of late-arriving Hawker Hurricanes were evacuated to the nearby islands of the Netherlands East Indies. When the British evacuated the aircrews to Australia, at least four Buffalos were turned over to Dutch Brewster squadrons.

In Burma, No. 67 Squadron suffered the same fate despite initial victories against attacking Japanese bomber formations. Flying alongside Curtiss P-40Bs of the 3rd Squadron, American Volunteer Group (The Flying Tigers), 67 Squadron fought a desperate but doomed defense of Rangoon. Only eight Buffalos were lost in the air, however, Japanese bombing raids, along with a lack of spare parts continued to erode the squadron and when Rangoon fell only six Buffalos remained airworthy. The Buffalos were evacuated to India along with a number of Hawker Hurricanes that had been rushed to Rangoon. 67 squadron claimed twenty-seven victories before their evacuation. Two survivors (a third aircraft was destroyed in a landing accident upon arrival in India) were briefly used by No. 146 Squadron RAF, as temporary replacements for Curtiss Mohawks (Hawk 75A-4). One of these was soon lost in an accident, and one account reports that



**A Buffalo MK I undergoing landing gear drop tests at the Brewster final assembly plant. The sealed over wing gun camera is located outboard of the starboard landing gear. The Wright 1820 G-105 engine whether new or a reconditioned 'previous owner' engine had a tendency to throw oil.**

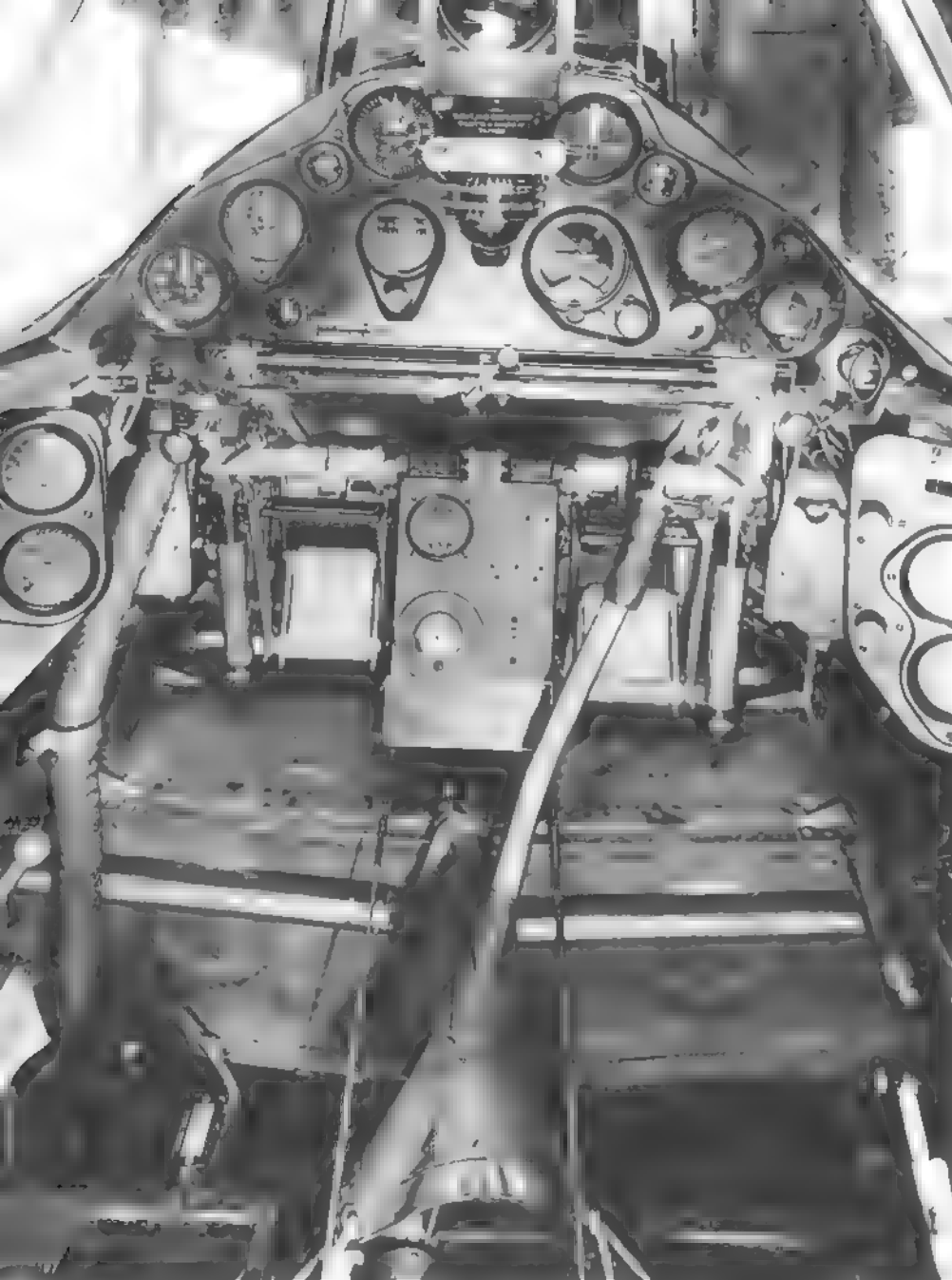
Commonwealth pilots transferred one Buffalo to the Indian Air Force.

The chaotic circumstances of the December 1941 to March 1942 period in the Far East make precise figures on British Buffalo losses unavailable. It is believed, however, that of the approximately 150 Buffalos available on 8 December, sixty to seventy were lost in air combat, forty destroyed on the ground, twenty lost through non-combat accidents, four transferred to the Dutch and six evacuated to India. The Commonwealth Buffalo squadrons claimed at least eighty kills and Australian historians believe that some units may have achieved a 2 to 1 kill ratio, sometimes with desperate tactics — one 453 Squadron pilot was reportedly killed when, guns jammed, he rammed a Japanese Ki 43 Oscar.

**A Buffalo wing in it's construction jig at the Brewster plant in Queens, New York. The one-piece wing is a box beam structure and even relatively minor combat damage would usually make replacement of the complete wing assembly necessary.**







The cockpit of the British Buffalo Mk I had the compass located in a well just forward of the pilot's seat. The Buffalo cockpit had no flooring in order to give the pilot an unrestricted view through the ventral window. The British MK III reflector gun sight is mounted at the top of the instrument panel.

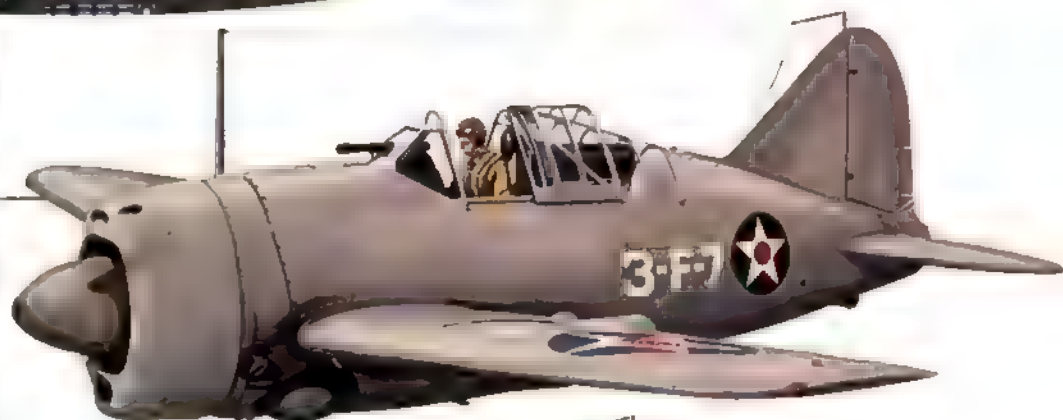


The Wright Cyclone engine installation of the Buffalo Mk I. The landing gear hydraulic retraction strut pivoted around the lower arm of the engine mount — just below and to the left of the exhaust stub. This joint proved to be fragile in operational use.

An F2A-2 (BuNo 1415) of Fighting Squadron Two (VF-2) aboard USS LEXINGTON during the Spring of 1941. A White Battle 'E', awarded for excellence during combat training, is carried on the forward fuselage.



An F2A-2 of Fighting Squadron Three (VF-3) in the overall Light Gray camouflage scheme adopted during early 1941. VF-3 was attached to the USS SARATOGA air group.



In October of 1941 as the Navy moved toward a wartime posture, all fleet aircraft were camouflaged in Non-Specular Blue Gray over Light Gray. VF-2's F2A-3 Buffalos were repainted with the new warpaint by January of 1942.



A Brewster Model 239 (BW-380) of LeLv 24 during the 'Continuation War' against the Russians, July 1941. Finnish Buffalos reigned supreme over the Northern Front during the early months of the war.



A Finnish Model 239 (BW-393) of 1 LeLv 24 based at Suulajarvi Finland during the Winter of 1943. The Yellow recognition markings were added to all Finnish aircraft by direction of the Luftwaffe.

A British Model 339E Buffalo Mk I (W8209) of No. 453 Squadron Royal Air Force at Singapore during late 1941. The pilot, SGT Read was killed when he rammed a Japanese Ki 43 Oscar after he had run out of ammunition.



This Model 339E Buffalo (W8138) of No. 488 Squadron RAF was fitted with an automotive style rear view mirror by its enterprising pilot. No. 488 squadron was based on Singapore Island during late 1941.



A Dutch Model 339C (B-396) of 2 Vliegtuig Groep V, Netherlands Indies Army Air Corps (ML-KNIL) on Java during the Autumn of 1941. The pilot LT Delbel would become the top scoring Dutch pilot during the fighting over the Indies during early 1942.

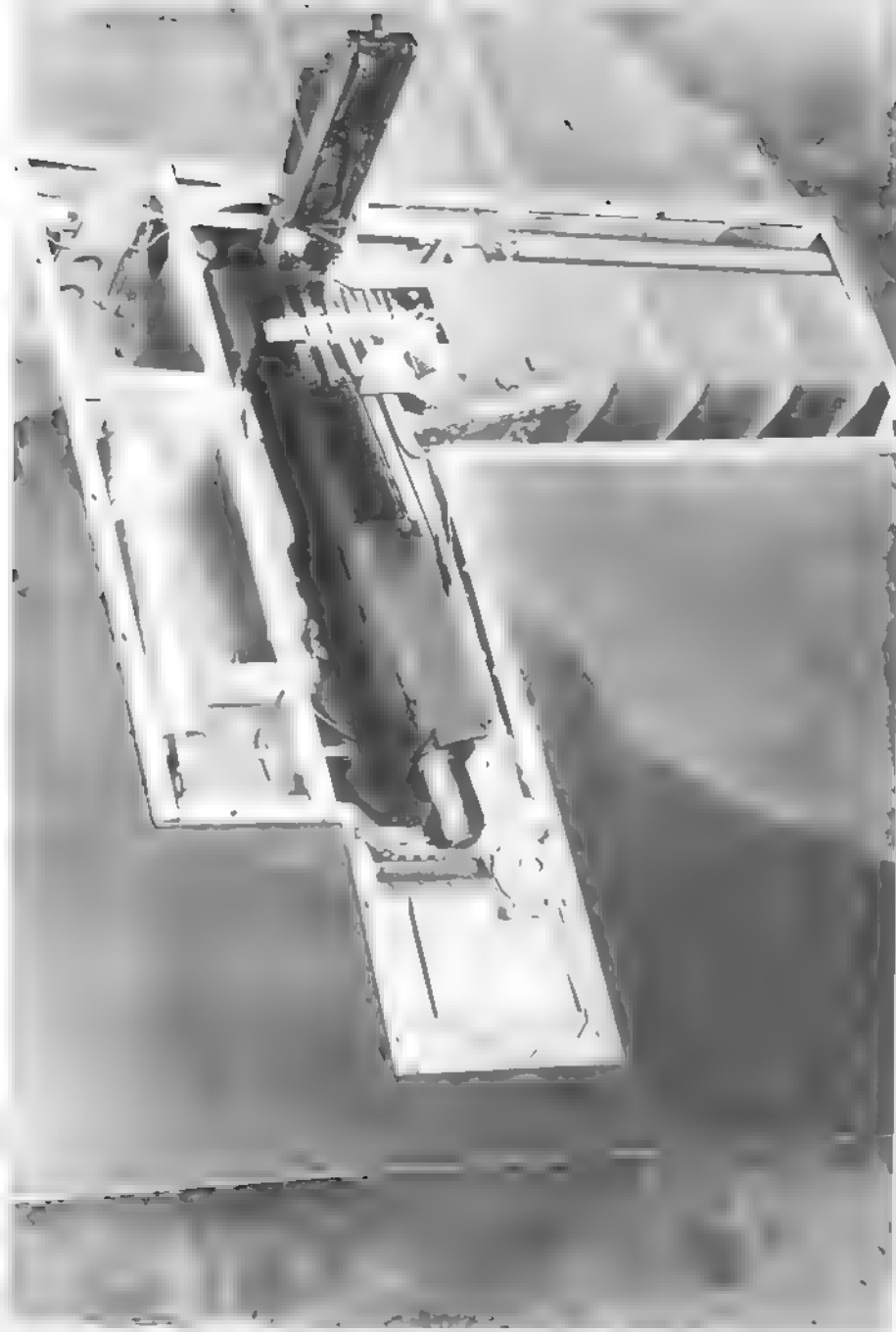


A Model 339-23 (A51-10) of 25 Squadron Royal Australian Air Force based at Perth, Western Australia during September of 1942. From August of 1942 through January of 1943, the nine Buffalos of No. 25 Squadron provided air defense for Western Australia.



An F2A-3 (BuNo 1612) attached to the Training Command at NAS Jacksonville, Florida during August of 1943. Only a few Buffalos were painted in the three tone Navy camouflage of Dark Sea Blue, Intermediate Blue over Non-Specular White.

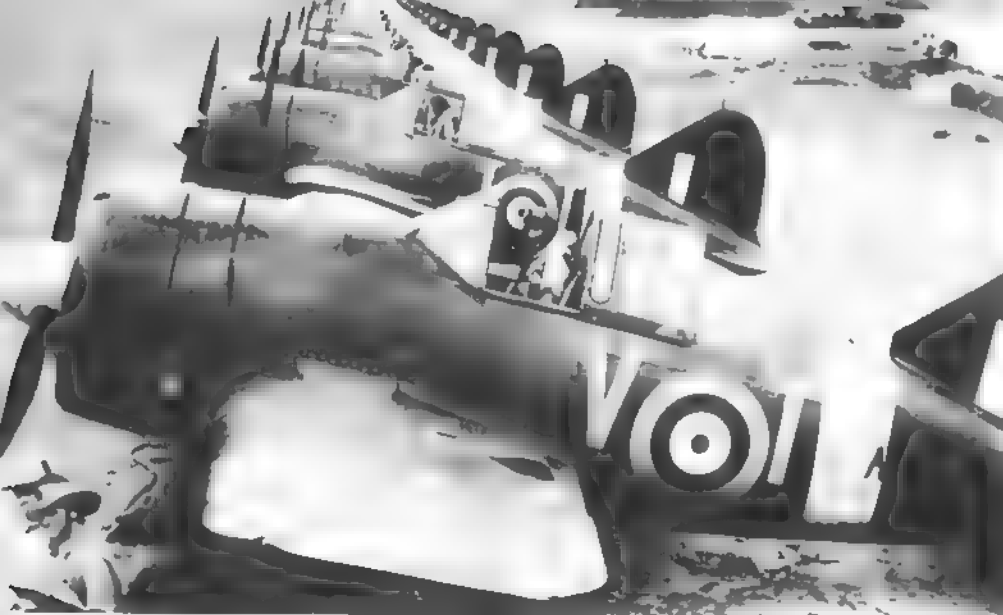




The port wing .50 caliber machine gun installation of a Buffalo Mk I. The wing ammunition boxes could hold up to 450 rounds of .50 caliber ammunition and were reloaded through an underwing access panel. The British found that rearming the Buffalo under operational conditions would take about thirty minutes.



The ventral window on this Buffalo Mk I has not been installed in its bay on the fuselage underside. One of the modifications required by the British Air Ministry was the installation of a second landing light under the starboard wing in addition to the standard light carried under the port wing.



No. 453 Squadron (RAAF) lined up at Sembawang Airfield, Singapore Island on 19 November 1941, the day the squadron became operational. All aircraft are finished in Dark Earth and Dark Green over Sky camouflage and carry the regulation Sky fuselage band with squadron codes in Medium Sea Grey.

No. 21 Squadron (RAAF) Buffalos lined up for inspection during November of 1941. The pilot in the Buffalo in the foreground is a non-commissioned Sergeant Pilot and wears a Mae West inflatable life preserver over his short sleeved tropical uniform.



This Buffalo of an Australian Squadron carries the personal marking *Shirley* on the fuselage side below the windscreen. The Model 339E was equipped with an opening panel in the first port side panel of the sliding canopy. Pilots frequently flew with this panel open as a form of air conditioning in the equatorial heat.

## Canopy

F2A-2

Model 339E

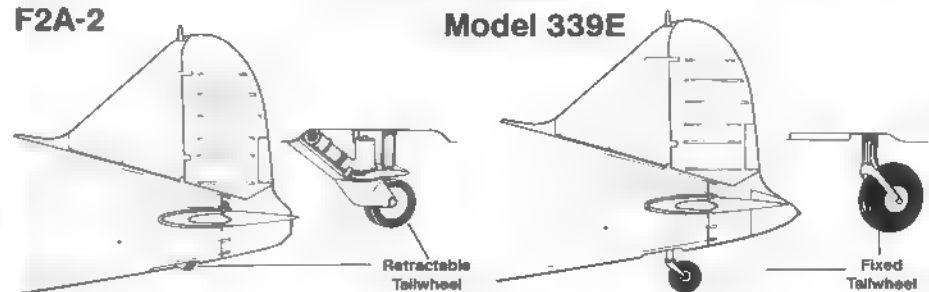
Movable  
Oval Panel  
(Port Side Only)



## Tail Wheel

F2A-2

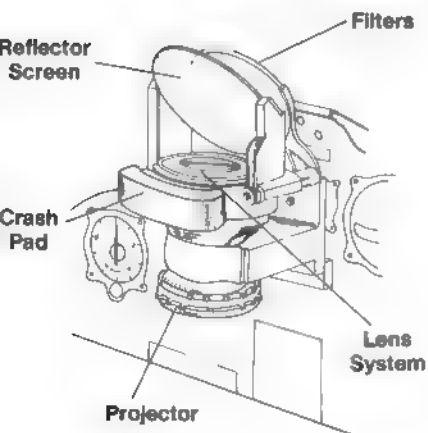
Model 339E





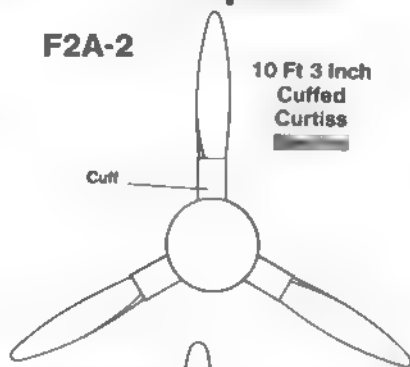
Far East Buffalos had the port undersurface over-painted in Black as a recognition aid. The color line ran down the center of the fuselage underside and all surfaces to port were painted Black, with the starboard surfaces painted Sky Type S.

## British MKIII Reflector Gun Sight



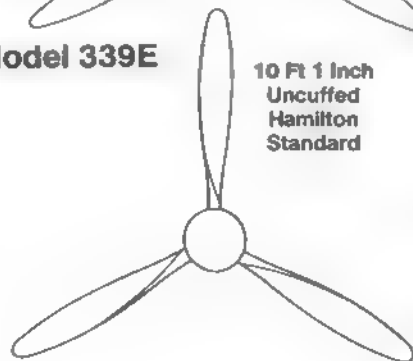
## Propeller

F2A-2



10 Ft 3 Inch  
Cuffed  
Curtiss

Model 339E



10 Ft 1 Inch  
Uncuffed  
Hamilton  
Standard



Nine Buffalos of No. 21 Squadron (RAAF) parked on an airfield in northern Malaya during late 1941. Many official British sources claim the Buffalo's poor performance contributed to the loss of Singapore and Malaya. Australian historians, however, believe that the Buffalo may have achieved a 2 to 1 kill ratio before being overwhelmed by superior Japanese numbers.

To confuse Japanese intelligence estimates of British strength dummy Buffalos were parked near the runways on various British bases. The Commonwealth squadrons actually had more Buffalos than trained pilots and on 8 December 1941, nearly half of the 150 Buffalos available were held in reserve.







Buffalos of No. 243 Squadron (RAF) on patrol over the jungles of Malaysia. Based at Kallang airfield on Singapore Island, No. 243 Squadron was tasked with the air defense of the vast Royal Navy base, Royal Navy ships at sea and the city of Singapore.

This Buffalo was assigned to No. 488 Squadron (RNZAF) and has been modified with an automotive rear-view mirror attached to the top of the windscreen. The New Zealanders received their first Buffalos only a month before the war started and had not completed their training when the war broke out.

This Buffalo of 488 Squadron RNZAF carried a four foot long Yellow and Green leaping dragon painted on the fuselage ahead of the cockpit. A worn grab handle cover makes the 'N' and 'F' of the squadron code appear joined.



# Model 339C and Model 339D Netherlands East Indies

The Netherlands East Indies — the vast island chain between Malaya and Australia — was the one of the main Japanese goals during the Second World War. The Dutch colonies were rich in oil and Japanese military planners realized that to successfully carry out their war plans, the Indies would have to be taken. President Roosevelt's mid-1941 oil embargo against Japan reinforced this belief and the decision was made to seize the Dutch East Indies early in the war.

Dutch plans for the defense of the Indies were based on a bomber oriented strategy. Martin 139WH (B-10) bombers would be used to cripple invasion fleets while still at sea, far from the beaches. But, during 1940, the war in Europe showed the limitations of such a strategy and the Netherlands government-in-exile sought to quickly reinforce the long neglected East Indies fighter force. The Netherlands Purchasing Committee in the United States sensibly concentrated on aircraft which were powered by the Wright Cyclone engine, since Cyclones powered the Martin bombers already in service. Purchasing Cyclone powered fighters would simplify supply and training of maintenance crews. The Commission placed orders for the Curtiss Hawk 75A-7, Curtiss-Wright CW-21B Demon and the Brewster Model 339C. Unfortunately the Dutch, like the British, found that new Cyclone engines were in short supply and while Brewster could deliver airframes, Wright could not produce enough new engines to power them.

## Model 339C

The shortage of Wright Cyclone engines forced the Dutch to reduce their planned purchase of 144 Brewster fighters by half. In the event, Brewster would produce two models of the Buffalo for the Dutch, twenty-four with used engines supplied by the Dutch themselves and forty-eight with new engines supplied by Brewster. The twenty-four aircraft with Dutch supplied engines were designated the Model 339C. These Buffalos were powered by 1,100 hp Wright 1820-G105 engines, a number of which were reconditioned TWA and American Airlines DC-3 engines. The Model 339Cs received Dutch serial numbers B3-95 through B3-118.

## Model 339D

The second production group of forty-eight aircraft were equipped with new and more powerful Cyclone engines purchased by Brewster directly from Wright. These aircraft were designated the Model 339D and were powered by 1,200 hp Wright 1820-G205 engines with Dutch serial numbers B3-119 to B3-167.

The seventy-two Buffalos destined for the *Militaire Luchvaart - Koninklijk Nederlands-Indisch Leger* (Netherlands Indies Army Air Corps, ML-KNIL), like the earlier Belgian Model 339B and British 339E, had evolved from the US Navy F2A-2 with export modifications. The canopy was similar to the British Model 339E but lacked the oval opening panel of the British canopy. The propeller was a 10 foot 3 inch uncuffed Curtiss Electric propeller and the Dutch Buffalos were fitted with the larger fixed tail wheel found on the British Model 339E. Customer specified armament consisted of two fuselage mounted .303 calibre machine guns and two .50 caliber machine guns mounted in the wings. The Dutch placed separate contracts for armor glass windscreens, reflector gun sights, self sealing fuel tanks and gun heaters, but because of differing time schedules most of this equipment had not been delivered to Brewster for installation before production was completed.

The Buffalos were shipped to the Indies without this equipment and began arriving in Java during April of 1941. Throughout the Buffalo's service in the ML-KNIL aircraft were operated with different standards of equipment and underwent numerous field modifications. A number of the Model 339Cs and Ds never received reflector gun sights and the pilots had to rely on simple fixed ring-and-bead sights.

By September of 1941 seventy-one Model 339C/Ds had been delivered with one (B3-119) remaining in the United States for needed repairs. A shortage of trained pilots initially prevented the Dutch from putting all the Buffalos into service. Two squadrons, Number 1 and



Three ML-KNIL Model 339Ds in formation during acceptance flights in the US. The Dutch camouflage colors have often been reported as being Green and Brown, but recent examination of color samples revealed that the upper surface colors were Olive Drab 41 and Medium Green 42 with undersurfaces finished in Silver lacquer.

Number 2 *Afdelingen* of *Vliegergroep V* (1-VLG V and 2-VLG V), were formed with twelve aircraft each during June and July of 1941. A number of Buffalos were assigned to Netherlands East Indies Flying School for use as operational conversion trainers and the remainder were held in reserve awaiting pilots who were expected to graduate from flight training by the end of 1941, and reserve officers who were being called up for service.

Both ML-KNIL Buffalo equipped squadrons were based at Semplak on the island of Java. The Dutch realized that air defense of the entire East Indies island chain was impossible — the islands in an arc between Malaya and Australia, had a combined land mass of over a million square miles. Units on Borneo and Celebes were separated from the Dutch headquarters on Java by hundreds of miles of open ocean, making centralized control and coordination nearly impossible. The Dutch planned to use their fighters to defend vital targets, escort bombers and augment other Allied units in accordance with joint defensive plans developed between the Dutch, Americans, Australians, and British.

During late November of 1941, the Dutch realizing that a Japanese attack could come at any time, transferred 1-VLG V to bases on Borneo, several hundred miles east of Singapore. The Flying School was closed and the instructors and students were used to form two additional Buffalo squadrons, 3-VLG IV and 3-VLG V. When the Japanese invaded Malaya on 8 December, the majority of 2-VLG V (as well as Martin 139WH bombers of VLG III) moved up to share British airfields on Singapore Island. Ground crews of 2-VLG V took advantage of the availability of British Buffalo spare parts to fit armor glass panels to the windscreens of their Model 339Cs.

2-VLG V fought alongside the Commonwealth Buffalo squadrons defending Singapore until it was withdrawn to Java on 18 January. The squadron was transferred to Borneo to join 1-VLG V for an all out attack on the approaching Japanese invasion fleet. On 22 January 1942 the Brewsters, armed with two 110 pound bombs on underwing bomb racks and accompanied by Martin 139WH bombers, attacked the Japanese troop transports enroute to Borneo — sinking two ships. The attack did little to slow the Japanese and two days later they landed troops on Borneo. By the end of January, Japanese troops were closing in on Dutch airfields and both Squadrons were withdrawn to Java to prepare for the expected Japanese landings.

On Java, 3-VLG IV and 3-VLG V were in action against Japanese forces invading Sumatra. When Japanese paratroops captured the vital oil installations at Palembang the Buffalos were pressed into service as dive bombers, bombing the oil storage facilities and refineries. On 9 February 3-VLG IV was decimated when a Japanese bombing attack caught the squadron's Buffalos on the ground. The squadron was disbanded on 12 February and the three surviving Buffalos were transferred to 2-VLG V. Later that month, SGT J. Adam, of 3-VLG V (like SGT Read of 453 Squadron RAAF) added to his kills by ramming a Japanese aircraft, but luckily SGT Adam was able to successfully bail out and landed safely.

These desperate tactics could not overcome the superiority of Japanese aircraft, their overwhelming numbers, and the progressive discovery and destruction of hidden ML-KNIL air bases by Japanese bombers. By Mid-February the Japanese had captured Borneo, Celebes, and Sumatra and were preparing for the invasion of Java. When the Japanese invasion fleet sailed on 26 February 1942, the three Buffalo squadrons were grouped together at Andir, but had barely a dozen airworthy aircraft including four transferred from 21 Squadron RAAF. Throughout the remainder of February the Buffalos were in constant combat, but were facing impossible odds. The last operational mission flown by Dutch Buffalos was on 7 March 1942 when two Zeros were shot down for the loss of one Buffalo. Java fell on 8 March and all Dutch forces in the Indies were ordered to surrender on the 9th. A number of Buffalos were captured intact at Andir by the Japanese Army and at least seven are believed to have been repairable. At least four Dutch Buffalos were transported to Japan and underwent testing by the Japanese Army Air Force's Testing Division at Tachikawa Air Base. Reportedly the flyable Buffalos, along with other Allied aircraft, were later used to film realistic propaganda movies.

During the three months of combat, the four ML-KNIL Buffalo squadrons lost seventeen pilots killed in action, thirty aircraft in air combat, fifteen to surprise Japanese bombing attacks, and a number to non-combat accidents, collisions and crashes in bad weather. Against these losses, the ML-KNIL Brewster squadrons claimed fifty-five enemy aircraft destroyed, a victory to loss ratio of almost 2 to 1.



**A factory fresh Model 339C ready for delivery to the Netherlands East Indies Army Air Corps (ML-KNIL). The Dutch ordered seventy-two Buffalos under the designation Model 339C and 339D. This Buffalo is loaded with 100 pound practice bombs for armament tests.**

**The Dutch national insignia consisted of a Black bordered Orange triangle and was carried on the fuselage sides, and lower wing only (not above). The ML-KNIL military serial number system included a manufacturer's letter 'B' (for Brewster) followed by the function code '3' (for fighter) and the individual aircraft number '119'.**





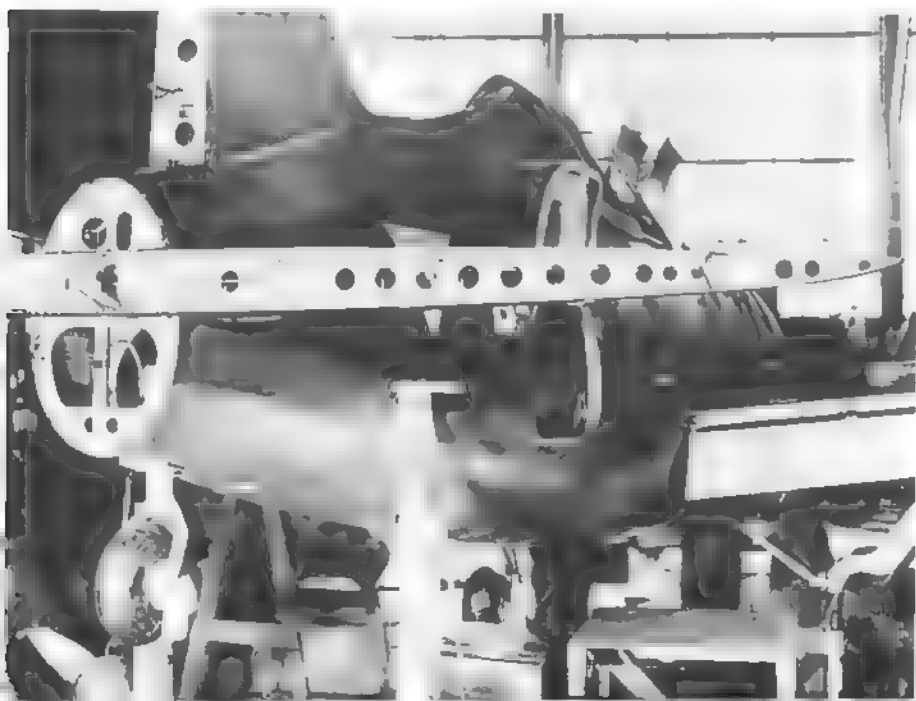


The second production Dutch Buffalo undergoes final assembly at Brewster's Newark assembly plant during early 1941. The ventral window bay provided a useful access for the mechanic working inside the fuselage.

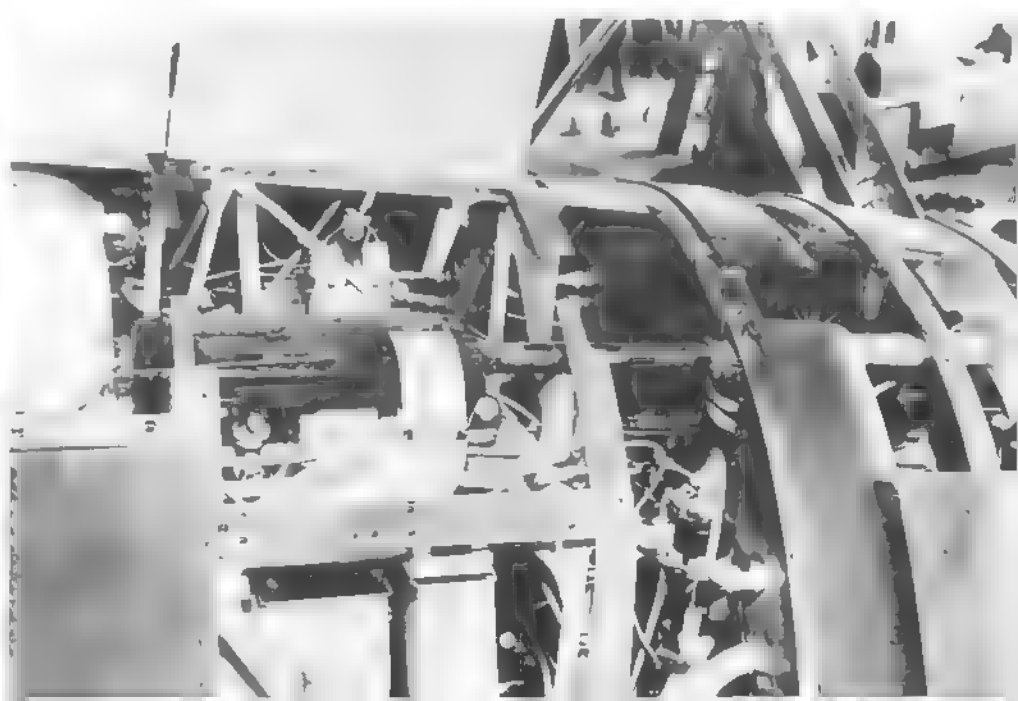


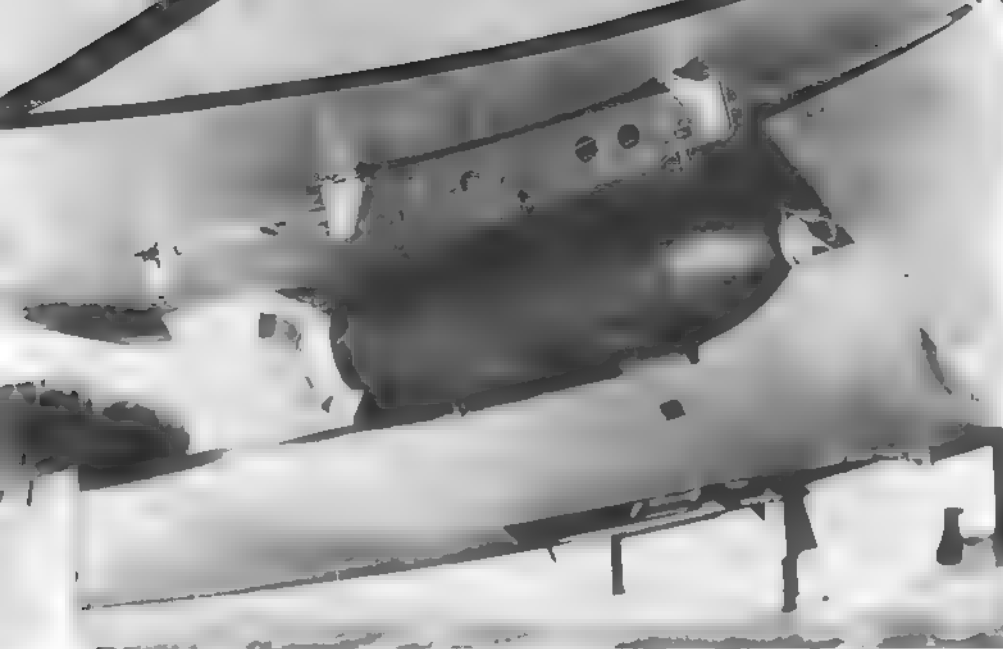
Mating the fuselage and wing assemblies involved lowering the completed fuselage onto the one-piece wing. The protruding pipe at the bottom of the national insignia is a lifting bar fitted through the rear fuselage jack point.

The open door is the radio equipment compartment access hatch. Both British and Dutch Buffalos were equipped with a fixed tail wheel and pneumatic tire replacing the retractable tail wheel and hard rubber tire of the F2A-2.



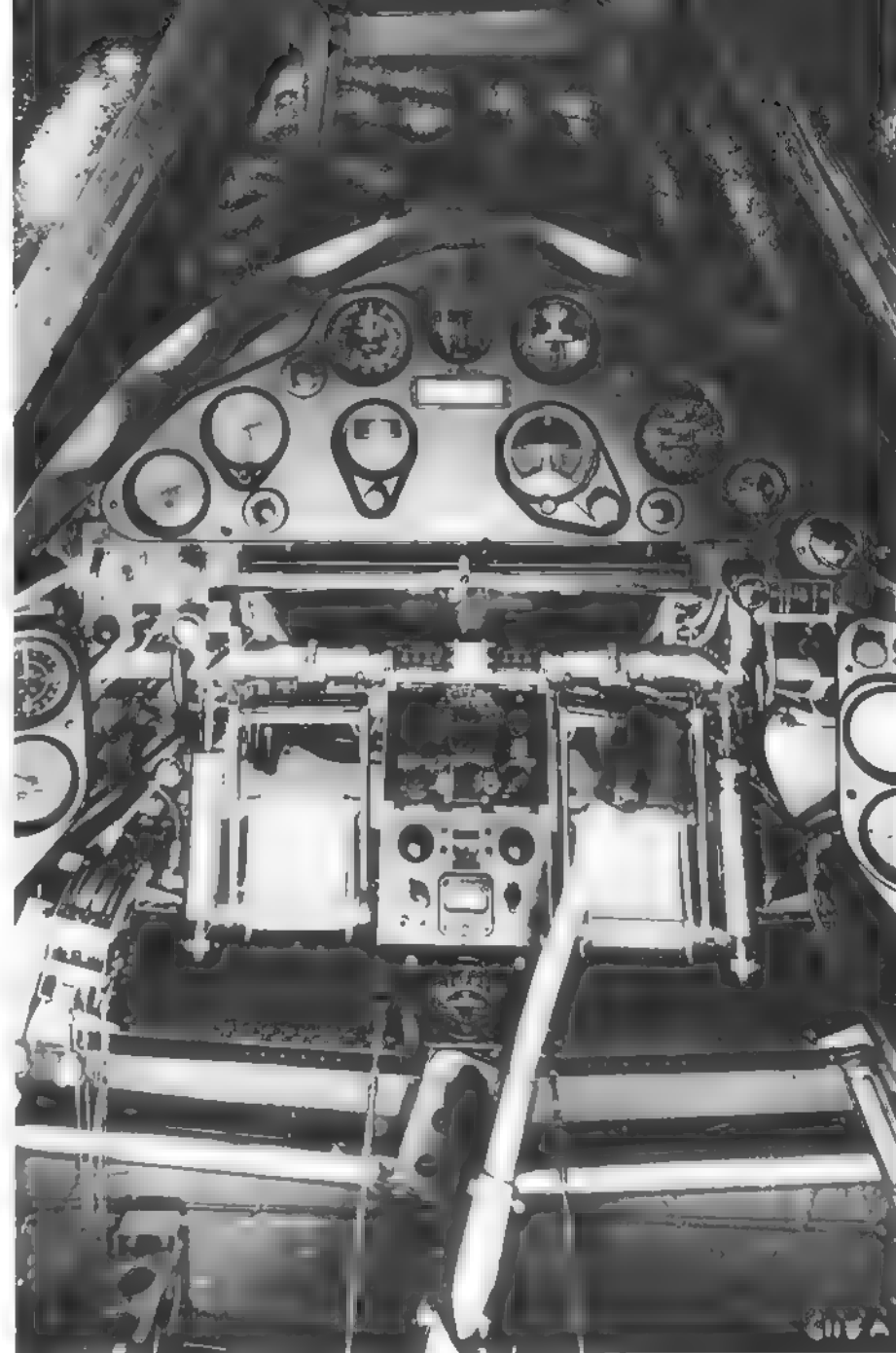
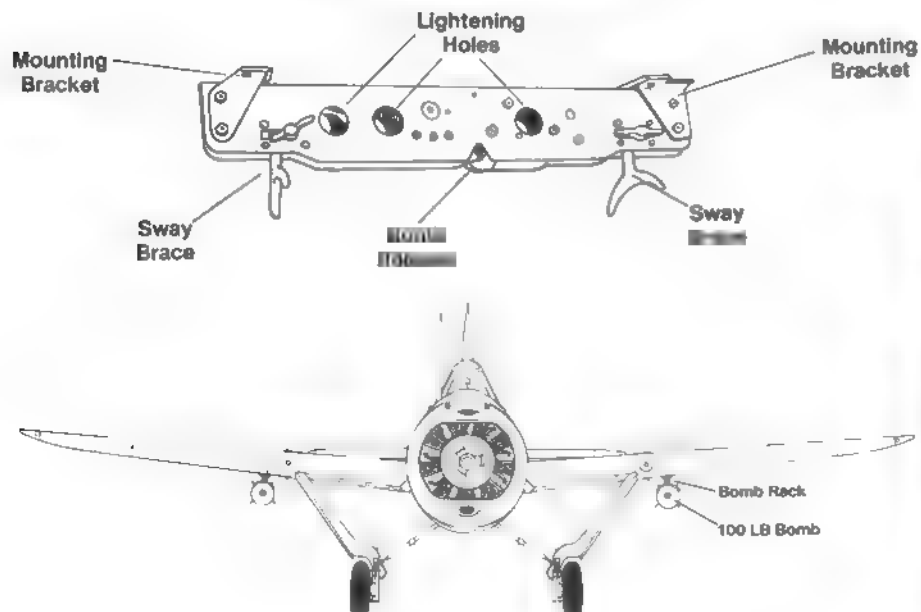
The fuselage mounted .303 caliber machine gun installation of a Dutch Model 339C. The stenciling 'Rechts' (Right) on the ammunition boxes is in Black. The machine gun barrel was clamped into a blast tube that extended through the cowling ring.





Dutch Brewsters were fitted with wing bomb racks capable of carrying 100 pound bombs. The wing machine gun rear locking post (normally covered by a small fairing) protrudes below the wing surface just above the bomb fin.

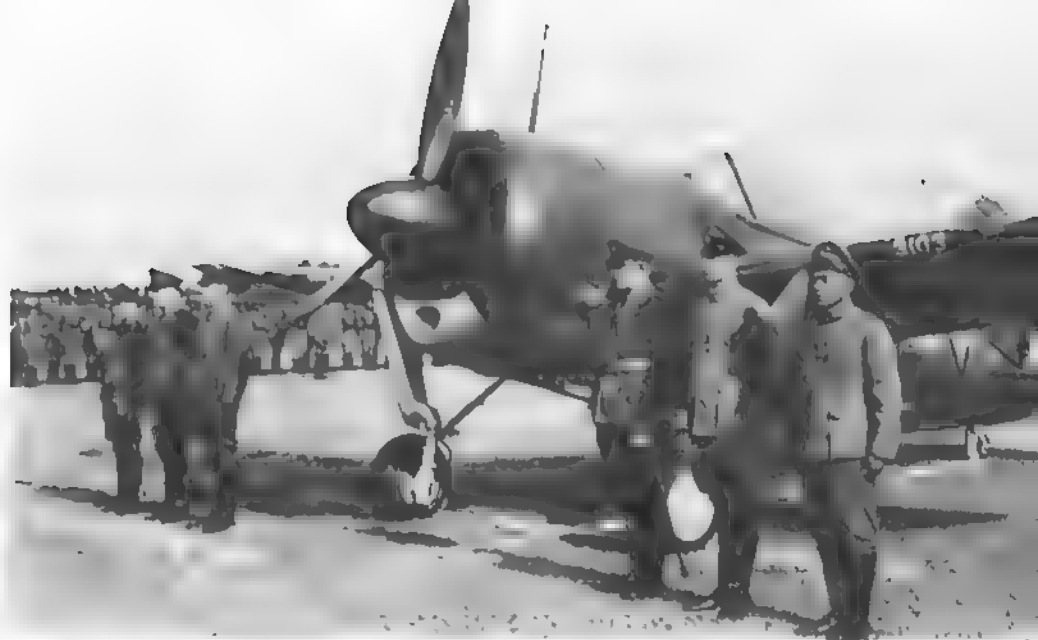
## Wing Bomb Rack



The Model 339C/D cockpit interior was painted flat Interior Green with Black main and side instrument panels. All instrumentation was in Dutch with metric measurements.



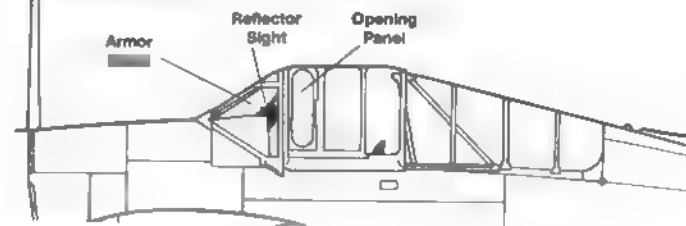
A Model 339D undergoes final acceptance flights in the US prior to delivery. The Dutch serial number is painted in White on the fuselage sides and on the wing leading edges. The Dutch national insignia was only carried on the underside of the wing and fuselage sides.



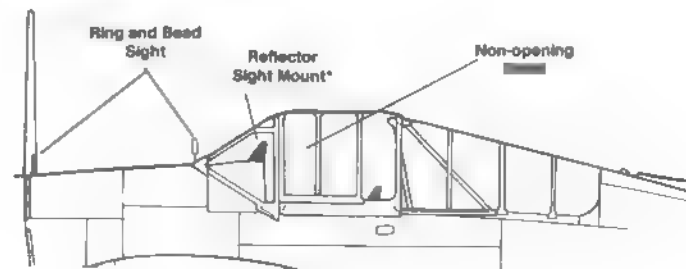
Dutch Buffalos lined up for a ceremony shortly after their arrival in the Netherlands East Indies in April of 1941. The Buffalos were delivered without armor and armor glass panels and reflector gun sights. A number would later be retrofitted with reflector gun sights while others retained the ring-and-bead sights throughout their service lives.

## Canopy

### Model 339E



### Model 339C/D



\*Not Always Installed





LT G. Diebel, one of the ML-KNIL's highest scoring pilots, poses in front of a 2-VLG V Buffalo on an airfield on Java. When 2 VLG V deployed to Singapore, a White fuselage band (similar to the RAF Sky Type S band) was added to the rear fuselage as a recognition aid. The Java Rhinoceros squadron insignia is visible on the fuselage in front of the cockpit.

When Java fell on 9 March 1942 the Japanese captured at least seven Buffalos at Andir airfield. The Brewsters all were painted with the Red-White-Blue flag national insignia adopted by the Dutch in February of 1942. The second aircraft in line is an ex-No. 21 Squadron (RAAF) Buffalo relinquished to the Dutch.



This ex-Dutch Buffalo was tested by the Japanese at the Tachikawa Army Force Air Base in Japan. Japanese technical reports concluded that the Buffalo was inferior to first line Japanese fighters but the construction techniques were worth studying.

The last Dutch Model 339 was still at sea when Java fell and was diverted to Australia. Assigned to the U.S. Fifth Army Air Force the Buffalo retained its Dutch camouflage and serial number but carried USAAF markings.



# F2A-3

During January of 1941 the Navy placed its final order for the Buffalo. 108 F2A-3 Buffalos, enough to equip five squadrons plus reserves were ordered and assigned BuNos 01516 to 01623. A number of reasons have been cited for the Navy's loss of interest in the Buffalo, such as problems with sealing the wing fuel tanks (a minor problem that was later fixed) and the seemingly insoluble landing gear trouble (although records show the number of landing gear accidents was cut dramatically by simply increasing tire pressure). Political rather than technical problems led to the Navy's decision to abandon further Buffalo development. By late 1940 Navy officials had become increasingly disenchanted with Brewster's management and Brewster's sales team had become a major public relations problem, when Brewster was charged with profiteering. The Navy was also tired of the Brewster's erratic production schedules.

The F2A-3 featured a redesigned nose section with a ten inch extension to the forward fuselage between the wing and the cowl which led to problems with the Buffalo's center-of-gravity (CG). Fuel capacity was increased to 240 gallons with the installation of new fuel cells in the wing leading edge and fuselage. The F2A-3 also carried additional armor, and ammunition capacity was raised to meet 1941 combat standards. In an effort to increase the F2A's firepower, Brewster modified nine sets of spare Buffalo wings replacing the standard .50 caliber machine guns with a Hispano-Suiza 20MM cannon installation. At least one F2A-3 was fitted with a set of the modified wings for trials at NAS Norfolk, Virginia, but the project was abandoned when further development of the F2A was terminated.

The canopy of the F2A-3 was modified to improve visibility with the heavy metal framing on the sliding canopy being deleted and the individual plexiglas sections butted together and sealed. A small emergency rations container was installed on the port side of the rear canopy behind the pilot's seat. Initially, the large propeller spinner of the F2A-2 was retained but was quickly discarded to save weight. Unfortunately since the same Wright R-1820-40 engine was used weight was becoming a serious problem. Gross weight of the F2A-3 had risen to 6,518 pounds, over 1,400 pounds heavier than the F2A-1. Maximum speed decreased to 321 mph, rate of climb fell to below 3,000 feet per minute, and the service ceiling was lowered to 32,600 feet. One experienced Buffalo pilot said he would have preferred the F2A-2 to the F4F Wildcat in combat, but would not have taken an overweight F2A-3 into a combat situation.

The increased fuel capacity dramatically raised both the endurance and range of the F2A-3. The additional 80 gallons of fuel gave the F2A-3 a maximum range of 1,680 miles — approximately thirteen hours of flying time. A number of F2A-3 pilots reported routinely flying five and six hour patrols. It is believed the Navy intended to use the F2A-3 to maintain standing patrols at considerable distances from the carrier, however, the advent of shipborne radar made the need for long range standing patrols unnecessary.

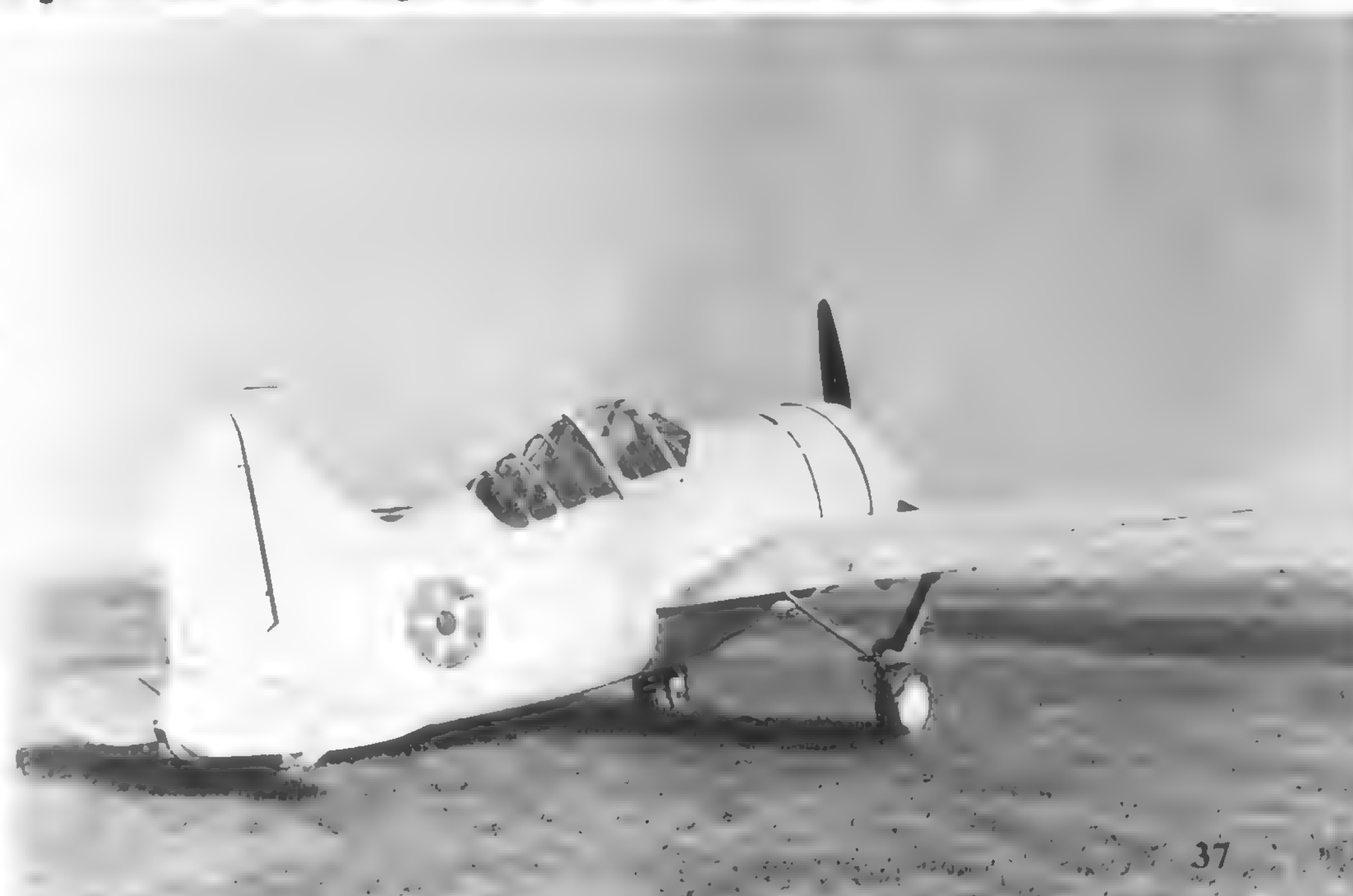
Brewster began production of the F2A-3 during January of 1941 and the Navy began replacing F2A-2s in active squadrons that summer. Beginning in August of 1941 VF-2, VF-3, and VS-201 re-equipped with the F2A-3. VF-3, however, flew the F2A-3 for only a short period before converting to the F4F-3 Wildcat. In the Atlantic VS-201 on USS LONG ISLAND (CVE-1) operated the F2A-3 alongside Curtiss SOC Seagull observation aircraft on Atlantic Neutrality Patrols. Once war with Germany was declared on 10 December 1941 LONG ISLAND began operations in the anti-submarine role. VS-201 retained their Buffalos until April of 1942.

In the Pacific Fleet, the 'Fighting Chiefs' of VF-2 were the only Navy squadron to employ the F2A-3 at the time of the Pearl Harbor attack. Flying from USS LEXINGTON VF-2's Buffalos took part in the back-and-forth movements of the Pacific Fleet during December and January of 1941. The F2A-3s were used on scouting missions relieving



**The first F2A-3 was temporarily fitted with a British style canopy when rolled out at Newark. The F2A-3 featured a lengthened forward fuselage and carried additional fuel, armor and ammunition. The increase in weight was not offset by increased power and performance suffered.**

**To improve visibility the F2A-3 featured an improved cockpit canopy, the heavy metal framing was deleted on the sliding canopy with the plexiglas panels butted together and sealed.**



SBD Dauntless scouts on station ahead of the carrier. The pilots of VF-2 grew moustaches and pledged not to shave until the squadron scored its first kill. The moustaches, however, were still in place when VF-2 was re-equipped with the F4F Wildcat during late January of 1941. VF-2s only action against the Japanese was a strafing attack against a reported Japanese submarine which resulted in a claim of minor damage.

When Navy squadrons re-equipped with F4F Wildcats, the F2A-2s and F2A-3s were transferred to the Marine Corps. The Marines were dramatically increasing the number of their land based fighter squadrons and Buffalos were used as initial equipment for a number of squadrons both at San Diego and Ewa on Hawaii. After a period of intensive training the Marine fighter squadrons (VMFs) passed the Buffalos along to the next new unit being formed and converted to F4F Wildcats.

Two operational Marine fighter squadrons were equipped with F2A-3s, VMF-211, based on Palmyra Island 1,000 miles south of Hawaii and VMF-221 on Midway Island, at the far western tip of the Hawaiian chain. VMF-221 scored the first American Buffalo victory on 10 March 1942. A four aircraft flight led by CAPT J. Neefus intercepted a Japanese preproduction H8K Emily four engine flying boat on a reconnaissance mission near Midway. In the engagement that followed the heavily armed Japanese flying boat was shot down and one of the F2A-3s was damaged by the flying boat's gunners.

VMF-221 would next see combat during the Battle of Midway, the first and last major action for the Buffalo as a front line US combat aircraft. On 4 June 1942 VMF-211 was equipped with twenty-one F2A-3s and seven F4F Wildcats based on Eastern Island, Midway. Under the command of MAJ Floyd B. Parks the squadron was able to put twenty-five fighters (twenty F2A-3s and five F4Fs) into the air to defend Midway against an incoming Japanese carrier air strike. During the engagement, thirteen Buffalos and two Wildcats were shot down (60% losses) and the Japanese successfully bombed Midway. CAPT P. R. White reported, *"It is my belief that any commander that orders pilots out for combat in an F2A-3 should consider the pilot as lost before leaving the ground"*.

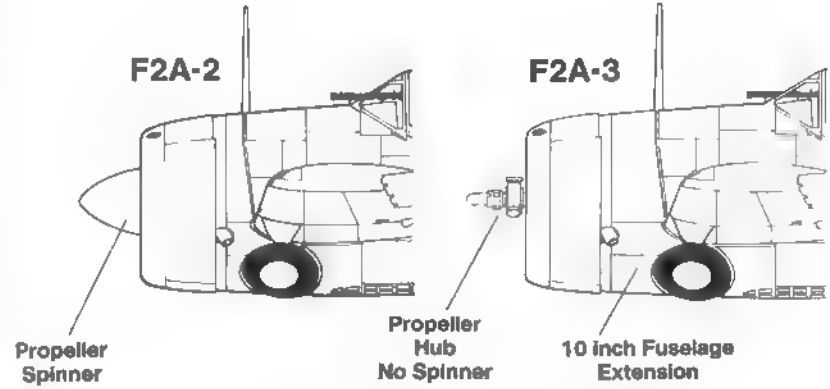
The Battle of Midway led to considerable criticism of the Buffalo both in official circles and in the press. But neither the F2A-3 nor the F4F Wildcat, in a defensive situation, was a match for the Mitsubishi A6M2 Zero. However, there were other factors which contributed to VMF-221's heavy losses at Midway. A third of the squadron's pilots had only joined the unit on 26 May, fresh from flight school with no time to gain operational experience before going into combat against seasoned Japanese pilots. The squadron had been intended to escort an offensive strike against Japanese carriers and the decision to defend Midway in the air against a far superior Japanese force was made at a lower level and was ill advised. Tactically the unit was split into two formations. The first formation (six Buffalos and three Wildcats) intercepted the Japanese raiding force of 107 aircraft, including a low escort of thirty-six Zeros, and was decimated by the time a second formation of twelve F2As and one F4F, led by CAPT Armistead, arrived on the scene. When the second Marine formation intercepted the Japanese attacking force, the escorting Zeros had reached altitude and were waiting for the second Marine attack. The battle was not all one sided, however, and a number of Japanese aircraft were claimed by VMF-221 during the engagement (the Japanese admit to nine aircraft lost, two A6M2 Zeros and seven B5N Kates).

The bitterness of the Marine aviators toward the Buffalo is understandable, especially since they knew the Navy had relegated the F2A to NAS Miami as an advanced trainer and Brewster had recently been taken over by the government for mismanagement. But the odds against them made the battle's outcome virtually predictable and both the pilots and the Buffalo did all that could have been expected of them. After Midway, all Buffalos were withdrawn from front line squadrons and passed to the training command as fighter-trainers.



SBD Dauntless dive bombers of VS-2 and F2A-3 Buffalos of VF-2 assigned to USS LEXINGTON's air group share the ramp at Ford Island, Pearl Harbor, Hawaii during November of 1941. All aircraft are painted in Non-Specular Blue-Gray over Light Gray camouflage, with White codes and a small national insignia on the fuselage.

# Nose Extension





[illegible]

Wings over Waikiki

[illegible]

$\lambda = \lambda^1 \cup \dots \cup \lambda^l \cup \{1\} \cup \{2\} \cup \dots \cup \{l\} \cup \{l+1\} \cup \dots \cup \{l+m\}$   
 $\cup \{l+m+1\} \cup \dots \cup \{l+m+n\}$  and  $\mu = \mu^1 \cup \dots \cup \mu^l \cup \{1\} \cup \{2\} \cup \dots \cup \{l\}$   
 $\cup \{l+1\} \cup \dots \cup \{l+m\}$  are partitions of  $n$  and  $m$  respectively,

THE UNTOUCHABLES

KID ROCK MICHAEL MANN JEFF BRIDGES

34. AND CITY OF NEWARK, N.J. - JONAS, L. PA.

A typical 1941 Brewster advertisement was released for publication the first week of December. On 7 December LEXINGTON was at sea and the VF-2's Buffalos did not take part in the defense of Hawaii.

**F2A-2**

**F2A-3**

### Telescopic Gun Sight

**Rounded  
Corners**

**Emergency  
Rations  
Hatch**

### Telescopic Gunsight

## Plexiglas Joint Lines

## Corners



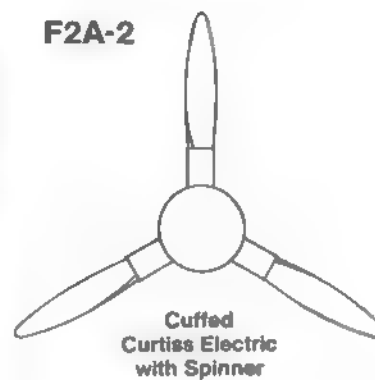
Enlisted Naval Aircraft Pilot G. Firebaugh poses in front of two VF-2 F2A-3s aboard USS LEXINGTON after the Pearl Harbor attack. The emergency rations access hatch set into the port side of the rear canopy is visible just above the wing. The large propeller spinner was often removed in service to save weight and improve engine cooling.



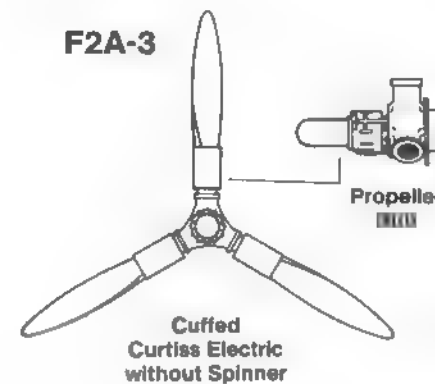
This VMF-211 Buffalo crashed on landing aboard USS LONG ISLAND (CVE-1) during July of 1942. The Buffalos were being transported back to the US for re-assignment to the Training Command. The Black fuselage code was 'MF-' followed by an individual aircraft number.

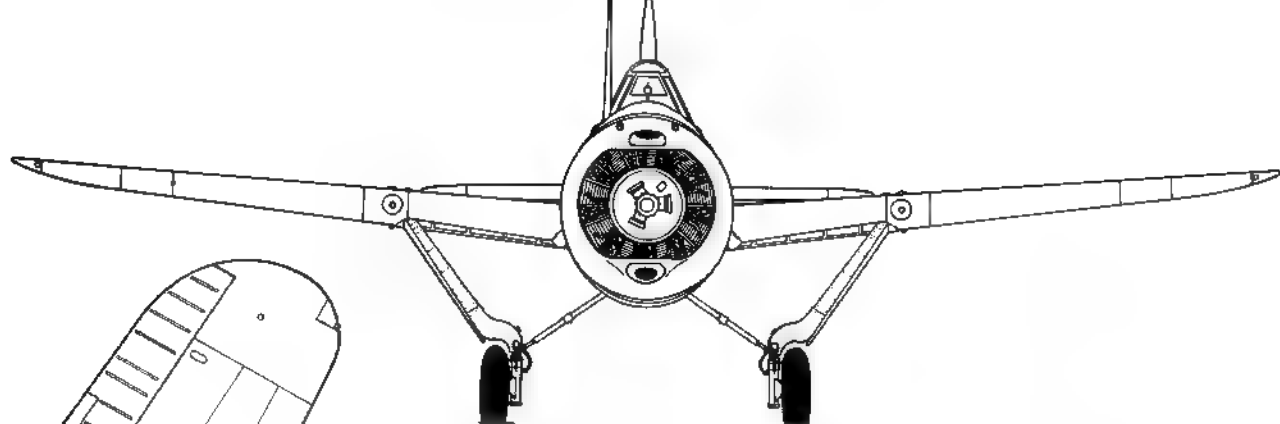
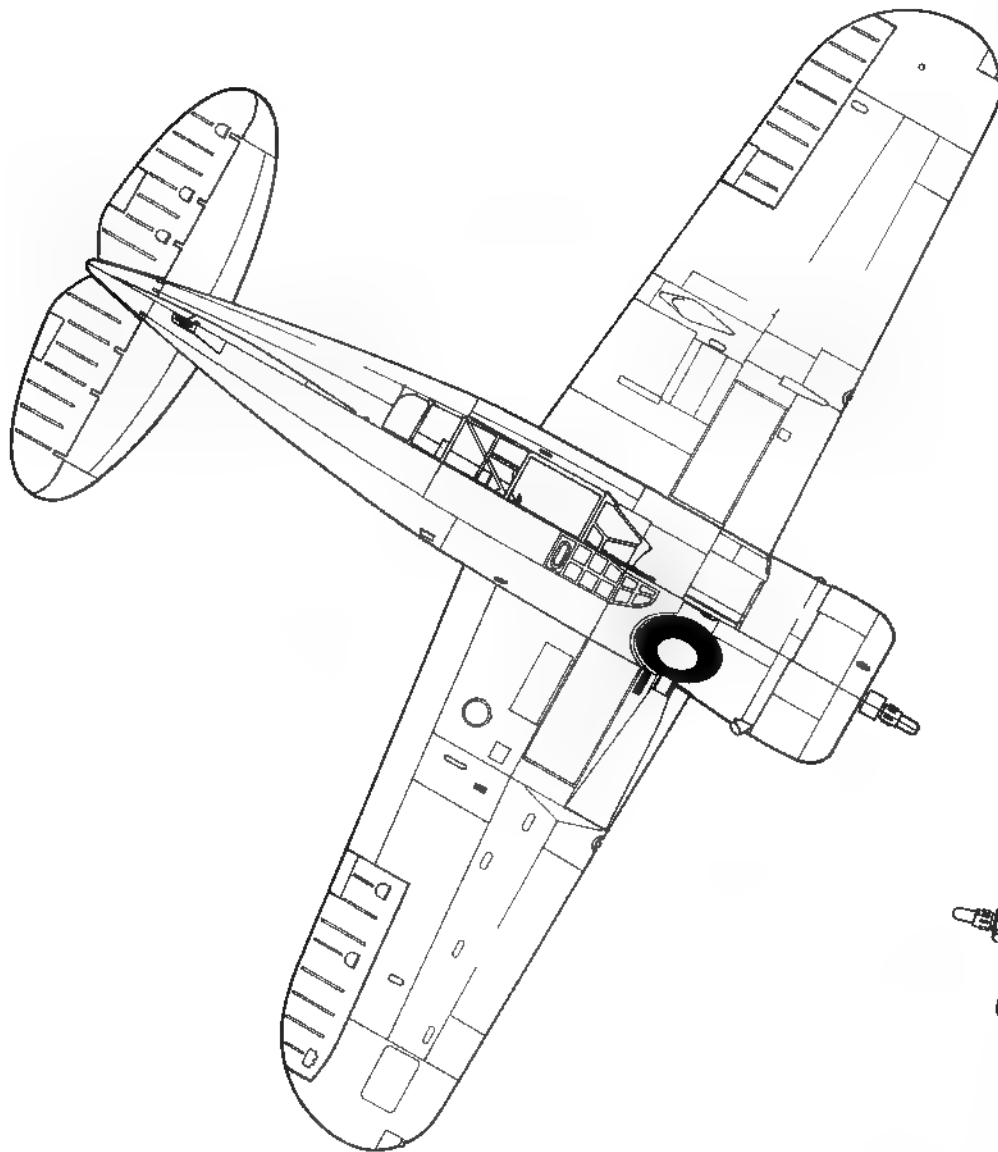
## Propeller

F2A-2



F2A-3





## Specifications

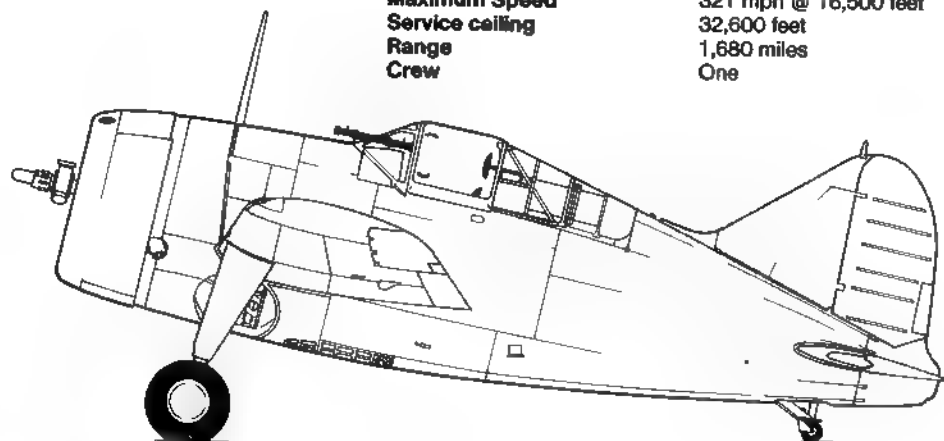
### Brewster F2A-3 Buffalo

|                |                  |
|----------------|------------------|
| Wingspan       | 35 feet          |
| Length         | 28 feet 4 inches |
| Height         | 12 feet          |
| Empty Weight   | 4,732 pounds     |
| Maximum Weight | 6,518 pounds     |

|            |   |
|------------|---|
| Powerplant | One Wright R-1820-40<br>rated at 1,200 hp |
|------------|---|

|          |                                  |
|----------|----------------------------------|
| Armament | Four .50 caliber machine<br>guns |
|----------|----------------------------------|

|                 |                       |
|-----------------|-----------------------|
| Performance     |                       |
| Maximum Speed   | 321 mph @ 16,500 feet |
| Service ceiling | 32,600 feet           |
| Range           | 1,680 miles           |
| Crew            | One                   |

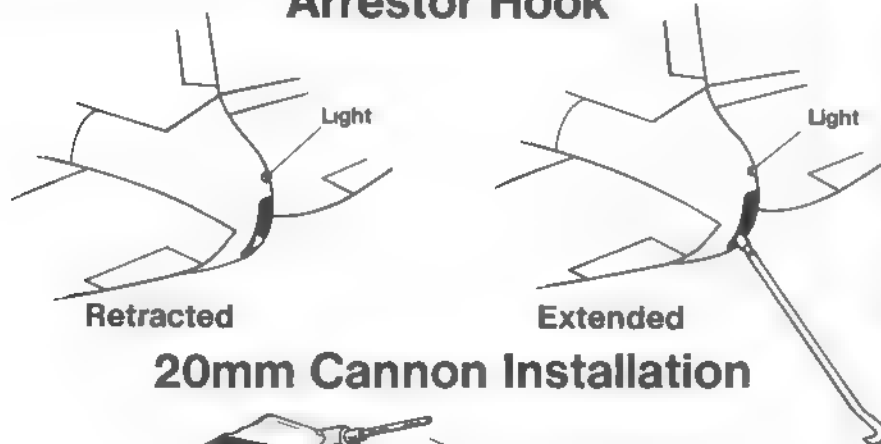




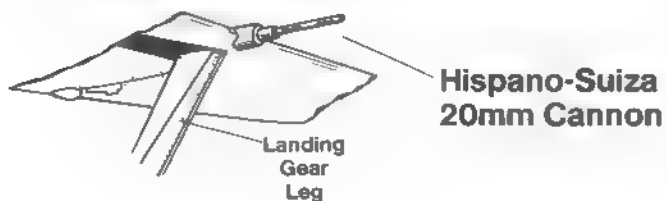


Marine Corps Buffalos based at Ewa airbase on Hawaii were dispersed to well-camouflaged parking areas under trees. This F2A-3 carries oversized wing national insignia and has all numbers and letters painted in Black.

## Arrestor Hook



## 20mm Cannon Installation



At least one F2A-3 was modified with the wing .50 caliber machine guns being replaced by 20mm Hispano-Suiza cannons. Brewster produced nine sets of modified wings, however, the program was cancelled when the Navy ended F2A production with the F2A-3.

# Model 339-23

## Australia

During early 1941 the Netherlands Purchasing Commission continued to seek additional Brewster fighters, but due to the shortage of Cyclone engines could only purchase twenty additional aircraft powered by the 950 hp Wright 1820-G5 engine under the designation Model 339-23. These Buffalos were given ML-KNIL serial numbers B3-167 through B3-186. The Model 339-23 was identical to the earlier Dutch Model 339D except that the forward fuselage had the same 10 inch extension as the F2A-3. Armament was changed from two 303 calibre machine guns and two 50 caliber machine guns to four 50 caliber machine guns. The Wright 1820-G5 engines installed in the Model 339-23 had been used on Dutch KLM DC-3 airliners and were re-manufactured by Wright for use on the Model 339-23. These were essentially the same engines used on the Finnish Model 239, but now powered a variant over half a ton heavier. Performance of the twenty Model 339-23s was seriously degraded and the aircraft took half an hour to climb to 28,000 feet.

The Model 339-23s were the last Buffalos to be built and contemporary records strongly suggest that Brewster delivered the aircraft in a haphazard condition. Deliveries commenced between January and March of 1942 but the aircraft were shipped to the Far East missing significant items of necessary equipment. Even if they had reached Java in time the Buffalos would have been of little use to the Dutch without engine exhaust manifolds.

When Java surrendered the four ships carrying the twenty Model 339-23s and one earlier Model 339D (which had been retained at the Brewster plant) were diverted to Australia, arriving between 9 March and 3 April. The Model 339-23s were slowly assembled during the spring of 1942 as the missing parts were gradually delivered. The Buffalos were initially assigned to the US 5th Army Air Force in Australia, and a number were repainted in USAAF markings. The Army Air Force had no need for the Buffalos but the Royal Australian Air Force (RAAF), hard-pressed for aircraft, accepted seventeen Buffalos beginning in June of 1942.

The Buffalos were issued Australian serial numbers A51-1 through A51-17 and six were assigned to No.1 Photographic Reconnaissance Unit. Nine others were used by No.25 Squadron for the air defense of Perth, and between August of 1942 and January of 1943 these Buffalos provided air defense in Western Australia. The RAAF modified several Buffalos by removing the wing guns in an effort to decrease gross weight and improve maneuverability. Two additional Buffalos were literally saved from a USAAF scrap heap, rebuilt, and used as gunnery trainers. After brief service with both No. 24 Squadron in eastern Australia and No. 85 Squadron near Perth, the Buffalos were returned to the US 5th Air Force. None of the Model 339-23s ever saw combat and they were finally scrapped during 1944.



This Model 339-23 parked on the ramp at Newark during December of 1941 was the last Buffalo built. The Model 339-23 featured the extended forward fuselage of the F2A-3, but was otherwise similar to the Model 339C/D. Too late to reach the Netherlands East Indies, the twenty Model 339-23s built were diverted to Australia.

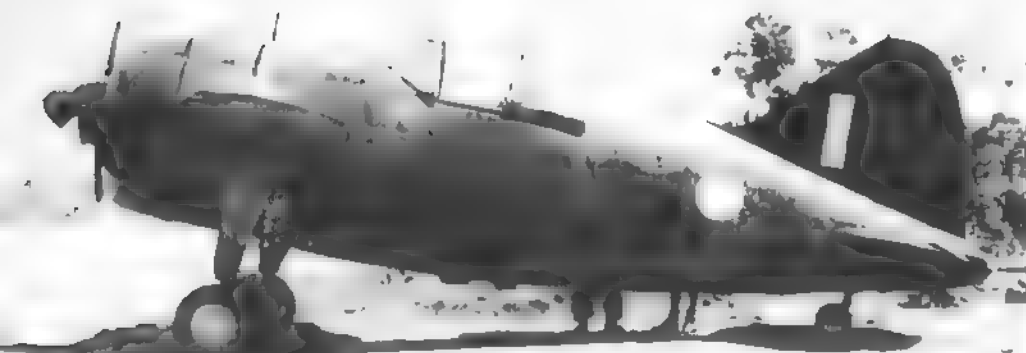
Initially delivered to the USAAF in Australia, a number of Model 339-23s were transferred to the Royal Australian Air Force. Nine were assigned to No. 25 Squadron RAAF for the defense of Perth. The Buffalos were painted with the revised Australian national insignia adopted during mid-1942. The Red center of the roundel was deleted to avoid being mistaken a Japanese 'meatball' during the heat of battle.





A pair of RAAF Buffalos over western Australia during 1942. Underpowered and overweight the Model 339-23 could only achieve 290 mph and took some thirty minutes to reach 28,000 feet. Luckily none of the Australian Model 339-23s ever saw combat.

This Buffalo of No. 25 Squadron carries a personal marking on the forward fuselage, a charging bull with the word *WEENIE* over the body of the bull, and a nonstandard Model 339E British style canopy. Brewster had evidently decided to use up parts left over from other Buffalo orders to complete production of the 339-23's.



A Buffalo nosed over at Pearce, western Australia, during 1943. The white numbers on the fin of are believed to have been added by the USAAF before transfer to the RAAF. The Australian serial number A51-13 identifies the aircraft as the 13th Buffalo (A51 was the Australian code for the Buffalo) received by the RAAF.

This natural metal Buffalo was retained by the USAAF in Australia during 1943 as a station hack with the fuselage antenna mast, spinner, and guns removed. The control surfaces and rear portion of the canopy were painted in Aluminum dope and the number on the rudder is in black.





# F2A-2 and F2A-3 Trainers

From 1938 to 1940 the Navy investigated various proposals to improve the Buffalo including one to install folding wings on the F2A. The last effort toward continued Buffalo development was an experimental pressurized cockpit variant with a four blade propeller designated the XF2A-4. One prototype was built, converted from an F2A-1 airframe, but the XF2A-4 was never intended to be a production aircraft.

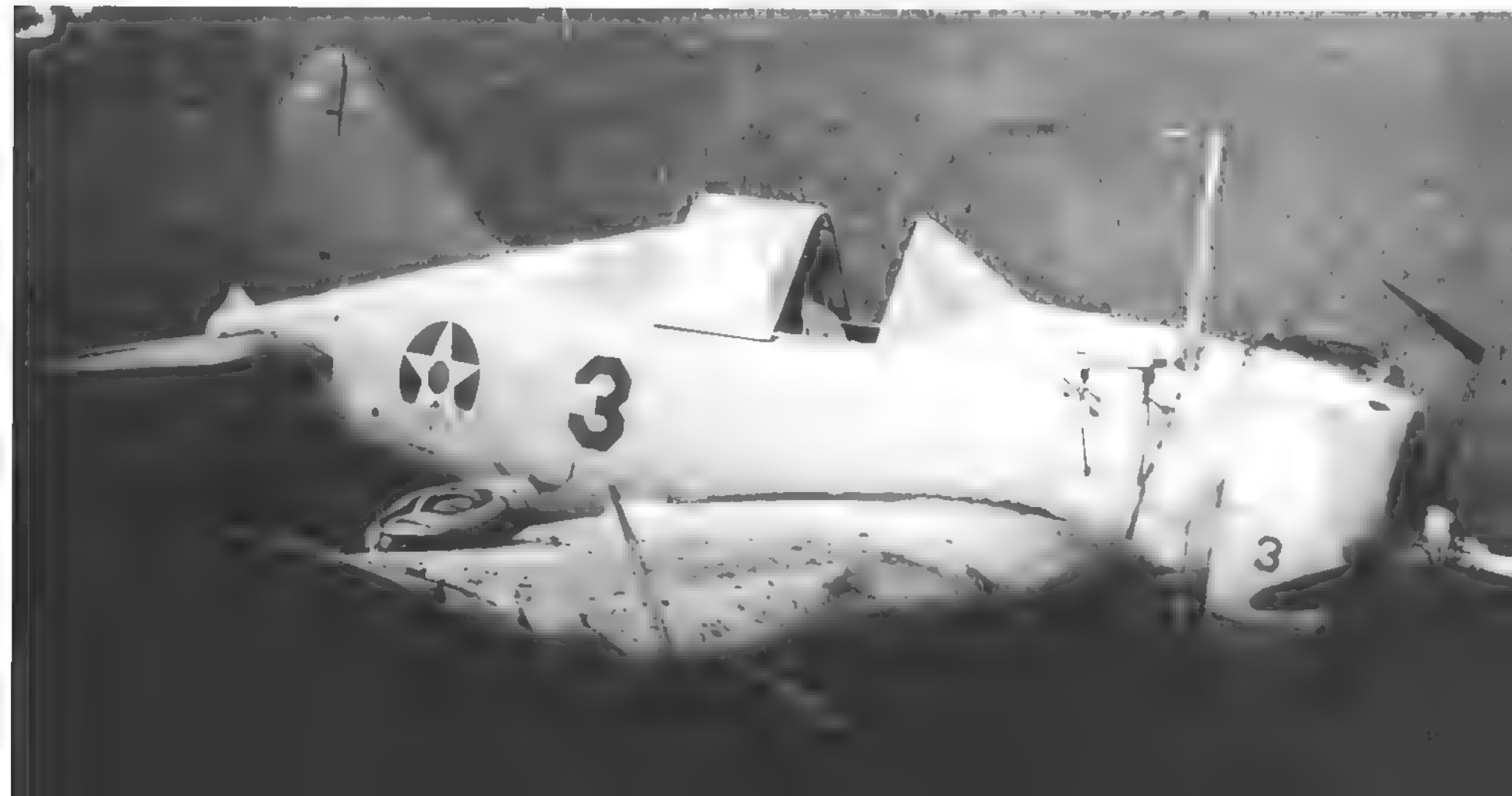
During 1941 the Navy decided against continued development and production of the Buffalo. This decision was brought about by a number of factors including Brewster's continued production problems, poor company management, and Washington's official distaste for the company sales team. Brewster had reassigned the Buffalo's designer, Dayton Brown, to other long-term projects including Proposal 33A, a twin boom carrier fighter design, further hindering any potential F2A development. Raymond MacCart, Brewster's new chief production engineer, was deeply involved with problems concern-

**This Red tailed F2A-2 is one of the rebuilt F2A-1s assigned to NAS Miami, Florida as a fighter-trainer. BuNo 1391 crashed after it suffered an engine bearing failure during March of 1942 and despite appearances the Buffalo was repaired and continued in service until retired during October of 1944.**

ing Brewster's two place dive bomber, the SB2A Buccaneer and as a result, no one at Brewster had an interest in further Buffalo development.

The Navy decision to abandon Buffalo development meant that the F2A would no longer be assigned to front-line units. The Navy would now concentrate on Grumman F4F Wildcat production until the Vought F4U Corsair and Grumman F6F Hellcat could be introduced into the Fleet. The remaining F2A-2s and F2A-3s in service would be used as advanced trainers, stepping stones for aviation cadets between the biplane 'yellow perils' of the training command and operational fighters. When Buffalos were withdrawn from front line squadrons they were sent to Navy training air stations such as NAS Miami and the last F2A-3s off the Brewster production line were delivered directly to Miami. Buffalos in Hawaii, on Palmyra Island, and even the survivors of VMF-221 on Midway were collected and returned to the United States for re-assignment to Training Command.

Buffalos in the training role were often fitted with a pneumatic 12 inch tail wheel tire, a detachable gun camera mounted on the starboard forward fuselage and a rearview periscope mounted on the canopy framing. Students rapidly wore out the F2As and accidents were common. By 1943 there were few operational F2As left and the bulk of Buffalos remaining in service were ordered scrapped during late 1943 and 1944. One F2A-2, however, continued to be used as a testbed until June of 1945.



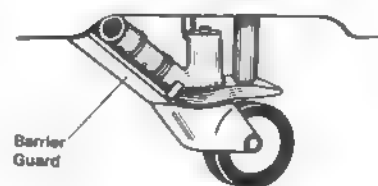
The Buffalo's later reputation is largely based on the circumstances of its use rather than the actual merits or shortcomings of the aircraft. The Navy congratulated itself for switching to the F4F Wildcat, but between 1941 and 1943 the Buffalo's victory to loss ratio (5-1) exceeded that of the Wildcat, which one source calculated at approximately 3.6 to 1. Of course the bulk of these Brewster victories were achieved by the Finns and received little publicity among the Allies.

In the dark days of early 1942, it was politically easier for the Allies to cite the Buffalo's shortcomings than to discuss the more fundamental reasons for the fall of Singapore and the Dutch East Indies. Later historians have difficulty reconciling the marginal performance of the Buffalo in the Pacific Theater with the Brewster's success in Finland, ignoring the differences in operating theaters, aircraft equipment, level of pilot training.

An NAS Miami based F2A-3 carries Non Specular Blue-Gray over Light Gray camouflage, with White tail surfaces and cowling ring. The bump at the top of the windscreen is a rear-vision periscope fitted to training Buffalos in preference to an outside mirror.

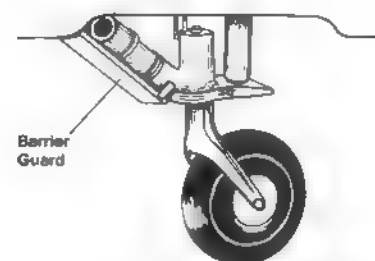
## Tail Wheel

### Hard Rubber Tire



Carrier Wheel

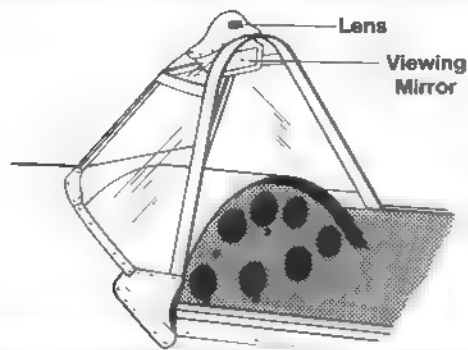
### Pneumatic Tire



Land Based Wheel



# Rear Vision Periscope



and the fact that the Buffalo's development had been abandoned before it ever saw combat. A contradictory history remains, a history of an aircraft where its earlier models were superior to its later variants, and an aircraft who's successes were largely forgotten.

Perhaps the recollection of one Navy F2A pilot best describes the Brewster Buffalo, "...she was a sweet little ship"

White '21' shows the effects of replacement parts from other aircraft. The wingtips and rudder came from an aircraft painted in the Light Gray scheme while the right aileron is a replacement from a less weathered aircraft. The rear portion of the canopy has been overpainted to cut down the heat in the cockpit from the Florida sun.



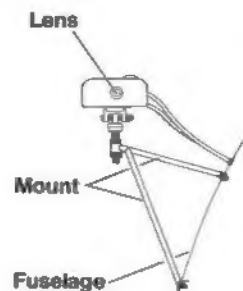
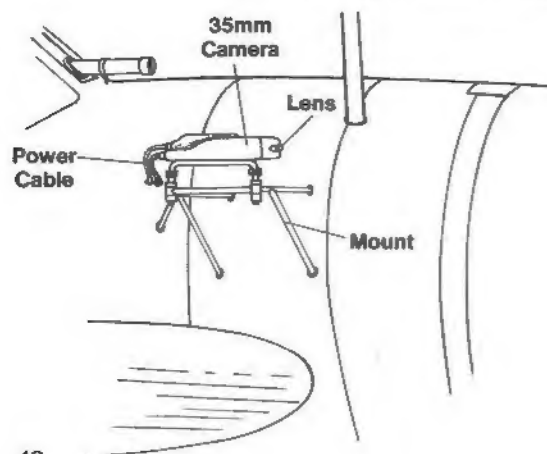


(Above) A Red-Orange tailed F2A-3 of NAS Maimi's training command is fitted with the pneumatic tail wheel tire installed on many shore-based F2As after May of 1942. BuNo 1553 had been previously flown by CAPT Humberd of VMF-221 when he downed a Japanese Zero during the Battle of Midway.

(Left) White '24', an F2A-2 (BuNo 1431), nosed over at Maimi during July of 1942. The crash was less serious than it looked and the Buffalo was repaired and remained on active duty until 1944. Although many Buffalo trainers had modern gunsights, this F2A-2 retained the older telescopic gun sight.

(Below) Another Maimi based F2A-3 (BuNo 1612) crash landed while on a training mission during August of 1943. White '48' carries a gun camera mounted to the fuselage side and has been repainted in the 1943 three tone camouflage scheme of Sea Blue, Intermediate Blue over Non-Specular White.

## Gun Camera







What might have been — Dayton Brown proposed this twin boomed carrier fighter, Proposal 33A, as a Buffalo replacement. The design was considered, but rejected, by the Navy during a 1941 design competition. A refined version was to have featured a bubble canopy and ejection seat.

# *Naval Aviation*

*From  
squadron/signal publications*

## **F4F WILDCAT** in action



squadron/signal  
publications inc.

Aircraft Number 84

## **F6F HELLCAT** in action



squadron/signal publications  
AIRCRAFT NO. 38

## **SBD DAUNTLESS** in action



Aircraft Number 64  
squadron/signal publications

## **SB2C Helldiver** in action



squadron/signal publications inc.  
Aircraft No. 54

## **PBY CATALINA** in action



Aircraft Number 62  
squadron/signal publications

## **SB2U Vindicator** in action



Aircraft Number 122  
squadron/signal publications

A Finnish Model 239 (BW-364) of 3 LeLv 24 based at Suulajarvi, Finland during November of 1942. Yellow '4' was flown by Warrant Officer Juutilainen, Finland's top scoring ace, who scored thirty-four of his ninety-four victories while flying the Buffalo.



A Dutch Model 339C (B-3114) of 2 VLG-V, Netherlands Indies Army Air Corps carries the Dutch flag insignia adopted during late February of 1942. It is believed that Dutch Brewster pilots achieved a kill ratio of almost 2 to 1 before being overcome by superior Japanese numbers.

